

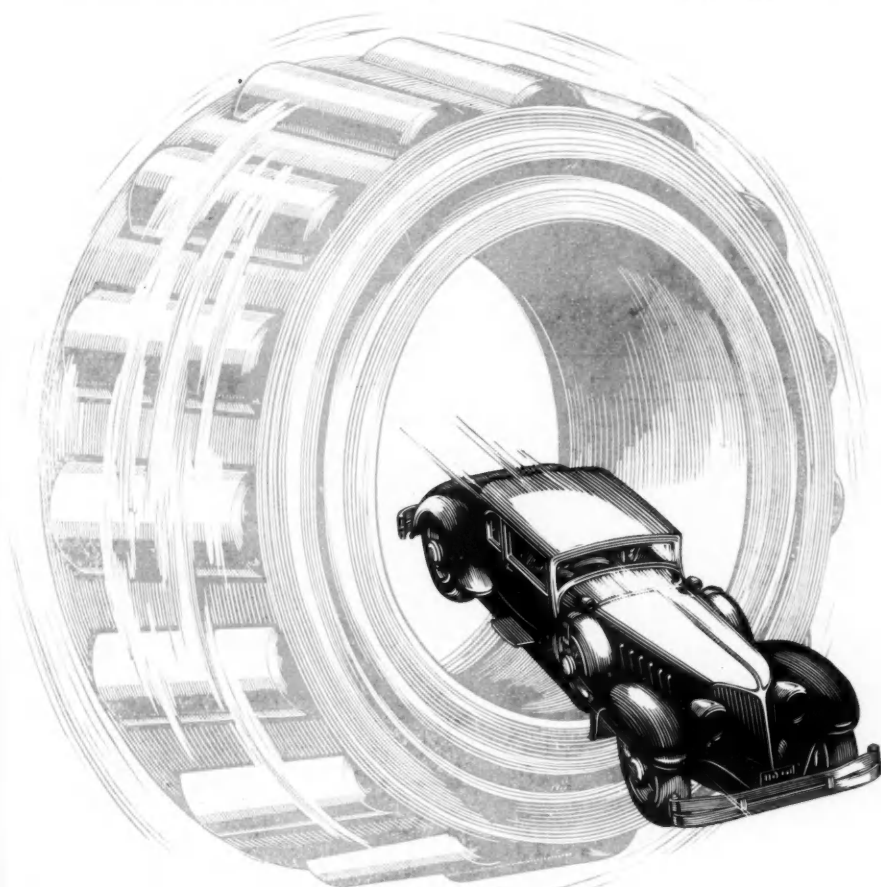
AUTOMOTIVE INDUSTRIES

LAND AIR WATER

Volume 64
Number 5

PUBLISHED WEEKLY AT CHESTNUT AND 56TH STREETS
PHILADELPHIA, JANUARY 31, 1931

35c a copy
\$3.00 a year



CROSSES INDICATE
TIMKEN BEARING EQUIPPED POINTS

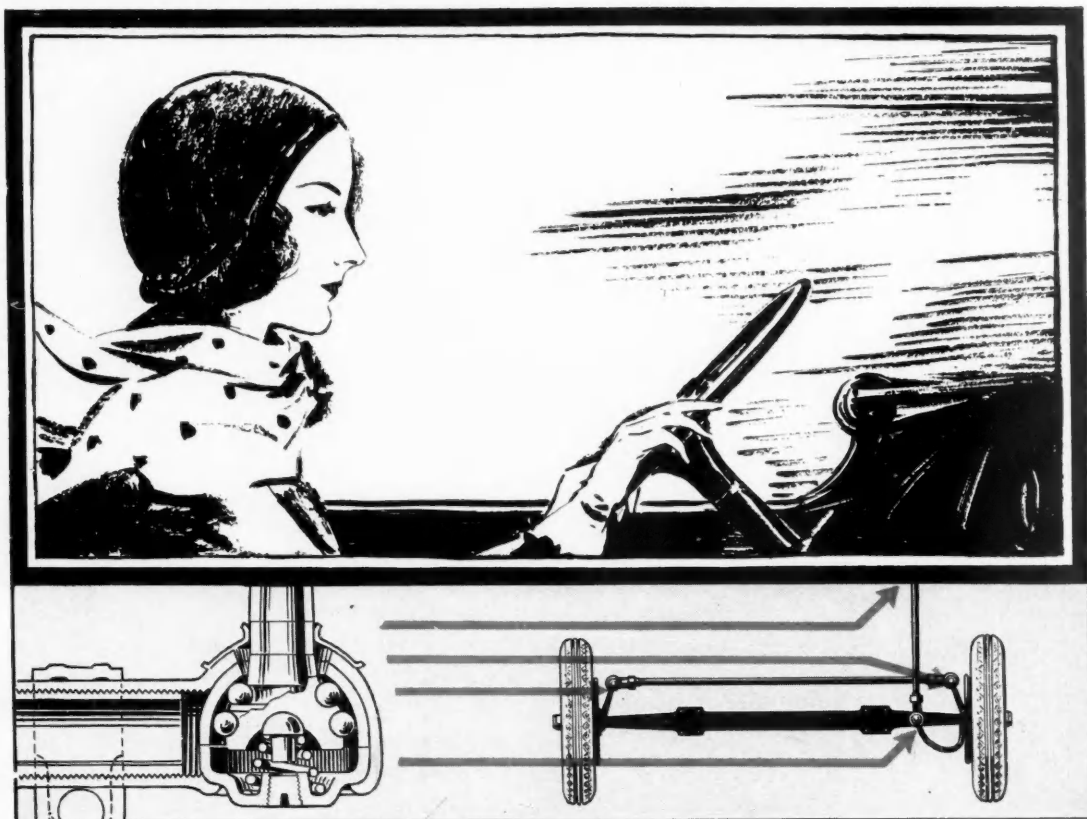
MAKE	MODELS	Front Wheels	Rear Wheels	Pinion	Steering	Differ- ential
Auburn.....	All	x	x	x	x	x
Austin.....	All	x	x	x	x	x
Cadillac.....	All	x	x	x	x	x
Chrysler.....	All	x	x	x	x	x
Cord.....	All	x	x	x	x	x
Cunningham.....	All	x	x	x	x	x
DeSoto.....	6	x	x	x	x	x
	8	x	x	x	x	x
	6	x	x	x	x	x
Dodge.....	8	x	x	x	x	x
Du Pont.....		x	x	x	x	x
Durant.....	614	x	x	x	x	x
	617	x	x	x	x	x
	75	x	x	x	x	x
Eicar.....	95, 96, 120	x	x	x	x	x
Essex.....	All	x	x	x	x	x
Ford.....	All	x	x	x	x	x
Franklin.....	All	x	x	x	x	x
Gardner.....	All	x	x	x	x	x
Graham.....	Standard Six	x	x	x	x	x
	Special Six	x	x	x	x	x
	Eight	x	x	x	x	x
Hudson.....	All	x	x	x	x	x
Hupmobile.....	All	x	x	x	x	x
Jordan.....	All	x	x	x	x	x
Kissel.....	73 & 95	x	x	x	x	x
	126	x	x	x	x	x
LaSalle.....	All	x	x	x	x	x
Lincoln.....	All	x	x	x	x	x
Marmon.....	69	x	x	x	x	x
	79 & H	x	x	x	x	x
McFarlan.....	All	x	x	x	x	x
Moon.....	All	x	x	x	x	x
Nash.....	6-60, 8-70	x	x	x	x	x
	8-80, 8-90	x	x	x	x	x
	All	x	x	x	x	x
Peerless.....	B & C	x	x	x	x	x
	A	x	x	x	x	x
Pierce-Arrow.....	All	x	x	x	x	x
Plymouth.....	All	x	x	x	x	x
Reo Flying Cloud.....	All	x	x	x	x	x
Reo Royale 8.....	All	x	x	x	x	x
Roosevelt.....	All	x	x	x	x	x
Studebaker.....	All	x	x	x	x	x
Stutz.....	All	x	x	x	x	x
Whippet.....	All	x	x	x	x	x
Willis.....	All	x	x	x	x	x
Willis-Knight.....	All	x	x	x	x	x
Windsor.....	All	x	x	x	x	x

And Still the List Grows

When all is said and done, the greatest sales asset a car can have is a reputation for sturdiness and long life... for the ability to "take it"... and continue taking it—indeinitely.

This reputation has been identified with "Timken Bearing Equipped" in foremost American automobiles for more than 30 years. The Timken Roller Bearing Company, Canton, Ohio.

TIMKEN *Tapered Roller* BEARINGS



Effortless Steering—Installed at Four Points

***Now!* Ready to Deliver**

for initial and replacement equipment

. made for each of the following cars:

Cadillac . . . La Salle . . . Pierce-Arrow
 Chrysler . . . Dodge . . . De Soto . . . Plymouth
 Studebaker . . . Hudson . . . Essex . . . Graham

BAKER BALL BEARING TIE ROD ENDS give a smoothness and freedom to automobile steering that only ball bearing action can give. Easily installed in new cars or old. If your service man cannot supply you write us for service information.

Baker Ball Bearing construction means: 1. Effortless Steering. 2. Positive and Sure Control—no lost mo-

tion. 3. Maintains original steering ease without further lubrication. 4. Ball Bearing efficiency minimizes wheel-fight and shimmy. 5. No "Oversteering." 6. Little or no wear—automatically taken up. 7. Dust and Dirt Proof. 8. No wandering on the road.

BAKER WHEEL & RIM COMPANY
 10228 Woodward Avenue

Detroit



BAKER ball bearing TIE ROD ENDS

● The punishment of Back Breaking on the Wheel, a relic of the Mediaeval and Spanish Inquisition Periods, has been discarded as inhuman by modern civilization.

ELIMINATE BACK BREAKING ON THE WHEEL

AUTOMOTIVE INDUSTRIES

THE AUTOMOBILE

Vol. 64

Reg. U. S. Pat. Off.
Established 1902

No. 5

NORMAN G. SHIDLE, Directing Editor
 LESLIE PEAT, Managing Editor
 P. M. HELDT, Engineering Editor
 JOSEPH GESCHELIN, Eng. Editor
 ATHEL F. DENHAM, Field Editor
 JEROME H. FARRIS, Asst. Editor
 HERBERT HOSKING, News Editor
 GEOFFREY GRIER, Art Editor
 A. B. CROFOOT, N. Y. News Rep.

Contents

From the Annual S.A.E. Meeting at Detroit Come Many New Ideas. By Norman G. Shidle	147
Just Among Ourselves at the S.A.E.	150
Automobile Show Opens at Chicago With Promise of Record Attendance	152
Looking Ahead a Few Years at the S.A.E. Body Session. By Leslie Peat	153
Aircraft Engine Session. By Athel F. Denham	155
Transportation Session	157
Production Session	159
Chassis Session	161
Engine Session	162
Detonation Symposium. By A. Ludlow Clayden	163
Diesel Engine Session	165
Fuels and Lubricants Session	167
General Developments Session	169
Fuel Research Session	170
General Session	171
Automotive Oddities	174
News of the Industry	175
Calendar of Coming Events	182
Advertisers' Index	82-83

Automotive Industries is published every Saturday by
CHILTON CLASS JOURNAL COMPANY
 Chestnut and 56th Streets, Philadelphia, Pa.

C. A. MUSSELMAN, President and General Manager
 J. S. HILDRETH, Vice-Pres. and Director of Sales
 W. I. RALPH, Vice-Pres. G. C. BUZBY, Vice-Pres.
 A. H. VAUX, Secretary and Treasurer
 JOHN A. CLEMENTS, Asst. Treasurer

JULIAN CHASE, Business Manager
 Automotive Industries
 Cable Address Autoland, Philadelphia
 Telephone Sherwood 1424

OFFICES

New York—U. P. C. Bldg., 239 W. 39th St., Phone Pennsylvania 0080
 Chicago—5 S. Wabash Ave., Phone Central 7045
 Detroit—719 Stephenson Bldg., Phone Madison 2090
 Cleveland—1140 Guardian Bldg., Phone Main 6860

Controlled by United Business Publishers, Inc., 239 West 39th St., New York;
 ANDREW C. PEARSON, Chairman, Board of Directors; FRITZ J. FRANK, President;
 C. A. MUSSELMAN, Vice-President; F. C. STEVENS, Treasurer.

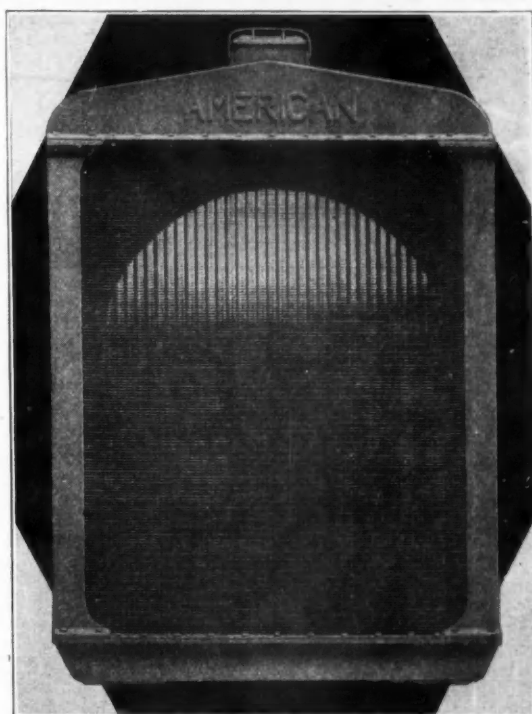
SUBSCRIPTION RATES: United States, Mexico, United States Possessions,
 Canada and all countries in Postal Union, \$3.00 per year; Foreign, \$6.00 per year.
 Single Copies 35c.

COPYRIGHT, 1931, CHILTON CLASS JOURNAL COMPANY

Member of the Audit Bureau of Circulations
 Member Associated Business Papers, Inc.

Automotive Industries—The Automobile is a consolidation of the Automobile
 (monthly) and the Motor Review (weekly), May, 1902; Dealer and Repairman
 (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the
 Horseless Age (weekly), founded in 1895, May, 1918.

Automotive Industries



THE engine of the American "Gopher," a popular excavating machine built by American Hoist and Derrick Co., is cooled by a Young heavy duty radiator. This service is of the hardest and the radiator must stand up under racking, twisting, vibrational strains.

The inherent stamina of the Young radiator is due to highest quality materials, correct design based on actual experience in the field, and soundness and honesty of manufacture. It is built to last the life of the machine, to cool dependably and efficiently 24 hours a day under the most severe and punishing conditions of service. It will not let down. If you have a problem let us help solve it.

Fine quality radiators for busses, trucks, tractors, power units, and all types of cooling installations; backed by a guarantee of satisfaction.



Young Radiators

YOUNG RADIATOR COMPANY
 Racine Wisconsin

Pacific Coast Representative

S. CLYDE KYLE
 Rialto Building
 San Francisco

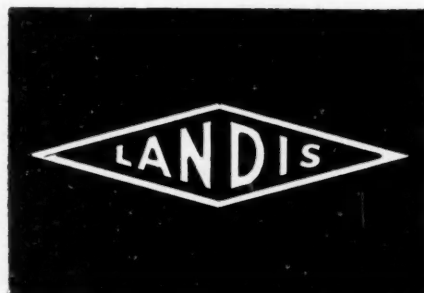


Reg. U. S. Pat. Off.

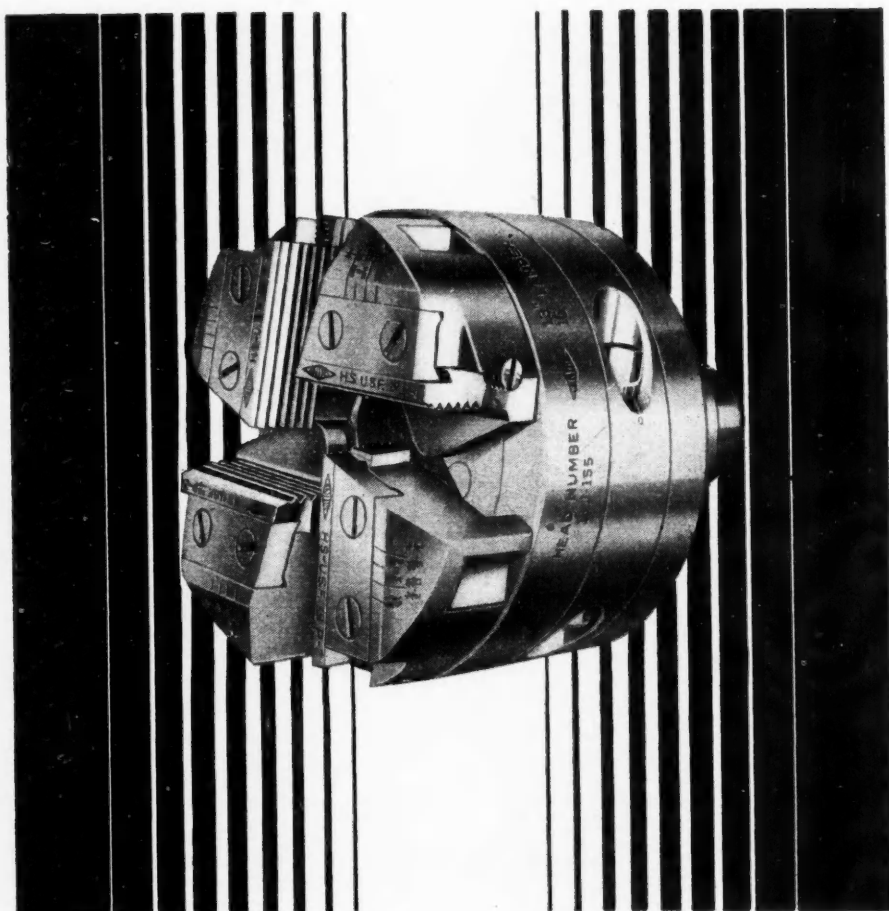
©Y.R.Co.

YOUNG RADIATORS ARE USED WHERE THE GOING IS TOUGH

January 31, 1931



LANDEX



FOR
AUTOMATIC
SCREW
MACHINES

THERE IS SO MUCH TO TELL—

about the LANDEX Head for Automatic Screw Machines.

It offers many distinctive advantages—the Landis chaser which accounts for its accuracy and low tool cost—a construction which insures long and efficient service without interruptions in production—and others.

There is so much to tell about the many features of the LANDEX Head. Why not write for Bulletin F-72? It contains complete information.

LANDIS MACHINE COMPANY, INC.

WAYNESBORO, PENNA.

Detroit: 5928 Second Boulevard

Cleveland: 504-505 Marshall Bldg.

The LANDEX, for automatic screw machines.

The LANCO, for automatic, semi-automatic and hand-operated threaders.

The LANDMATIC, for turret lathes and screw machines.

There is also the very complete line of Landis Threading Machines, including the Landis Automatic Forming and Threading Machine.

Agents in all the principal cities of the world

January 31, 1931

Automotive Industries

From the Annual S. A. E. Meeting at Detroit Come Many New Ideas

by Norman G. Shidle

WITH an abundance of pungent engineering ideas darting about the sessions with something like the speed and power of electrons being ejected from a radio-active substance, the 1931 annual meeting of the Society of Automotive Engineers was propelled into history between Jan. 19th and 23rd.

Great frankness—little equivocation—extreme directness—aroused vitality—vigorous practicality were dominating characteristics of the sessions held in Detroit last week, which constituted the greatest automotive technical gathering in many years.

Concerning bodies, engines, chassis, tires—concerning passenger cars, buses and trucks—concerning almost every branch of the industry, this meeting produced alert, eager thinking and speaking about radical trend possibilities. 'Twas a meeting which was nearly all high spots, in the reporting of which one scarcely knows where to begin.

Possibilities for cars with engines in the rear and com-



Vincent Bendix, the new S.A.E. president

Vigorous and well attended sessions usher in the new S.A.E. year

pletely streamline or "tear-drop" bodies, however, probably caused more intensive thought in the sessions and the informal confabs among the engineers than any other single topic.

The crowd opened up some heavy guns on this subject on the opening evening of the meeting, and, while it didn't get into the formal sessions to any major extent after that time, it furnished the nucleus of more informal extra-session conversations than any other single idea generated. While plenty of diverse views were bruited about as regards rear-engined cars, one could not fail to come away from the meeting with a very definite belief that such designs are very, very much nearer to practical commercialization than at any previous time in the history of the American automotive industry.

No indication whatever appeared, on the other hand, of the appearance of such a design in any important stock model within the next twelve or eighteen months, although the possibility of

I believe that automobile engines are going to be in the back of cars a generation from now. There is certainly no reason why we should sit behind racket, behind all odors and all of the heat and build a car backwards, as we really are doing today.

L. C. Hill, President, Dietrich, Inc.

some such car being offered to the public within that period is not outside the realm of reasonable potentialities. The chief interest at this time, in other words, is definitely among the engineers rather than the general executives.

The seriousness of engineering interest, however, is indicated by the fact that a good bit of the extra-session discussion centered particularly around the relative merits of different methods of building such a car, rather than around the merits or demerits of the type of design itself.

L. C. Hill, president, Dietrich, Inc., presiding at the body session on the opening night, said: "I believe that automobile engines are going to be in the back of cars a generation from now. How we are going to sneak them around back there, either underneath the car or over the top, without making the jump at one time is beyond me, but there is certainly no reason why we should sit behind racket, behind all odors and all of the heat and build a car backwards—as we really are doing today."

Harry T. Woolson, chief engineer, Chrysler Corp., said regarding engine location: "There is no doubt that in the next ten years, maybe longer, there will be some changes, but they will be for utilitarian reasons. If the engine works better in the rear it will no doubt arrive there."

Gilbert Betancourt, of Hudson, opposed the idea of rear-engined cars on the basis of safety, stating his belief that "the motor in front means safety more than anything else," adding his thought that the engine in front makes for easy driving. Herbert Chase, McGraw-Hill Co., said, "I want to second the things that Chairman Hill has said about the possibilities of cars with engines mounted in the rear," and then went on to describe one or two experimental designs which he has seen in model form.

But while rear-engined cars did generate a bit more interest than any other single item among a majority of the engineers present, it did not in any sense dominate the sessions.

Unusually sharp controversy arose about the relative merits of air and water-cooled cars, with pro-

ponents of both sides exchanging frank information about failures as well as successes.

"Tear-drop" type bodies seemed to get almost unanimous approval as the final evolution likely to result from body design trends as the years go on.

Production men pleaded for elimination of averaging overhead bur-

den costs and for allocation of burden to the smallest possible economic centers—even to individual machines.

Fuel men and car engineers debated old problems in lubrication and detonation with new vigor.

Bus and truck operators alternately praised and excoriated commercial vehicle design; argued as to whether future bus use would tend toward more small vehicles or fewer and larger ones, and developed from the engineers some definite indications of special interest in transmission developments on commercial vehicles.

Strong emphasis on improvement of fuel injection systems for aircraft engine work developed at the aircraft session, while radically new possibilities for the use of rubber in constructing automotive parts were among the major points debated at the chassis session, where problems growing out of the accelerated trend to drop-center rims also got a thorough airing.

At the Diesel engine sessions, oil chemists told the engineers that Diesel development rested largely on the development of engines capable of functioning properly on available fuels, while Diesel men came back with the contention that fuels better adapted to their engines should be developed. It was generally agreed that much still remains to be learned about Diesel fuel systems.

Proof that steadiness of nerves is less after taking an automobile ride than before was one conclusion growing out of riding quality research activities described at the general development session, where new uses of zinc in automotive construction also were outlined.

Of unusual importance was the talk by Robbins B. Stoeckel, commissioner of motor vehicles of the State of Connecticut, who stated that:



E. P. Warner, retiring president of the S.A.E.

"Considered as a proximate cause alone the automobile does not by its mechanical safety imperfections make many accidents." That mechanical failures do contribute to make accidents, however, Mr. Stoeckel holds as "undeniably true," adding, "It is important to note that except in a small number of cases such a failure is a contributory and not a proximate cause."

Even more important perhaps was his clear statement: "After all, why should a state tell an industry how to do things which are primarily within the industry's knowledge. As to brakes, why not say 'automobile brakes must be adequate' and let it go at that?"

And so ran the gamut subjects on which mind met mind; on which criticism and counter criticism were played like notes in a great technical symphony. Nearly 1000 members and guests came to the meeting. And the average actual attendance at the technical

sessions unquestionably was larger than at any previous similar gathering.

On Wednesday morning the Detonation Symposium was held under the chairmanship of R. E. Wilson. The octane number was adopted for rating all knocks of gas lines. It was learned that the Institute of Petroleum Technologists of England are in accord with this, having adopted the same system.

Under the auspices of an aircraft session on Wednesday evening, E. R. Armstrong talked to an interested audience on the economics of ocean airways with special reference to the seadrome system.

On Thursday evening, the Detroit section, under the leadership of its chairman, P. J. Kent, of Chrysler, was host to the national Society at a dinner, which numbered among the guests at its speakers' table eleven past presidents of the S.A.E. And notable in this notable group was Henry M. Leland, president of the society in 1914.

Guests at the Speakers' Table Detroit Section Society of Automotive Engineers Annual Meeting Dinner, Thursday, Jan. 22 1931



Front row, left to right: James Schermerhorn, Jr., master of ceremonies; Henry M. Leland, past president (1914); E. L. Manning, General Electric Co.; Larry A. Hawkins, General Electric Co., speaker; Vincent A. Bendix, president (1931); Mayor Frank Murphy, Detroit; P. J. Kent, chairman, Detroit section

Standing, left to right: George L. McCain, vice-president; Norman G. Shidle, directing editor, *Automotive Industries*, and chairman of meetings committee; B. B. Bachman, past president (1922); H. W. Alden, past president (1912 and 1923); J. G. Vincent, past president (1920); Col. W. G. Wall, past president (1928); E. P. Warner, past president (1930); Thomas J. Little, Jr., past president (1926); J. H. Hunt, past president (1927); David Beecroft, past president (1921); W. R. Strickland, past president (1929); W. Cameron, General Electric Co., and O. T. Kreusser, vice-chairman, Detroit section

Just Among Ourselves

Intensive Discussions Brought Out New Ideas

THE business depression certainly has been a good thing for stimulating engineers to think and managements to take some real interest in the results of that thinking. Never has there been an S.A.E. annual meeting in our experience which started off with such vivid, eager discussion of old as well as new topics and then maintained its pace well through all the sessions.

To the chairmen of the opening day sessions, to be sure, must go a good share of the credit for the liveliness of the discussion which followed the papers on air-cooled engines, torsional vibration dampers and color as a factor in motor car marketing which filled the technical sessions on that day. But despite the fine chairmanship performances of Alex Taub and Clayt Hill, the sessions could never have produced the battledore-and-shuttlecock effects which they did except with an audience unusually eager for participation in the mental exercises being broadcast.

The Committees Worked Then Worked Some More

SEVENTEEN committee meetings, in addition to two meetings of the Council of the Society, were held during the five days of the annual meeting. If one were to guess the average attendance at these committee meetings as about 12 and the average length of the meetings as about two hours, a little mathematics would lead one to the conclusion that committee work required some-

thing like 27,360 man-minutes.

Our guessing of averages may be a bit awry, but we're close enough to indicate clearly the large amount of sincere, personal effort put in each year by scores of active Society men to further the development of practical specific engineering projects in operation through the medium of the Society and to assist the building of the Society as a whole.

Even the Hotel Lobbies Seethed With Innovations

THROUGH the hotel rooms and lobbies as well as in the formal discussions, engineering ideas which were Cinderellas yesterday were being entertained like visiting royalty. Technical concepts which a few years ago in the hallways of the same gathering met usually with a shrug and a knowing smile, at this meeting found ready listeners and, at worst, interested opposition.

Rear engined cars, cars with independent wheel springing, two-cycle engines, cars with body shaped like tear-drops, cars of moderate price which will travel 90-100 m.p.h. with safety and comfort, radical developments in electrically operated units, fluid flywheels transmission systems which will stand up on buses with 300 hp. engines, amphibion motor buses, 50-hp. cars with top speed of 65 and 70 m.p.h.—these and scores of other design developments of similar unusualness were freely argued back and forth by responsible, staid engineers as though they were problems of real importance and practical interest.

Plenty of more radical ideas than these have been talked of in the past, to be sure; but usually they were talked of in about the same spirit that Edward Bellamy wrote "Looking Backward" half a century ago. The men most interested in them in the past usually were mechanical enthusiasts whose commercial importance often was in inverse ratio to the zeal and uniqueness of their ideas.

But not at this meeting. Sober men bearing the weight of heavily commercialized technical responsibilities talked of all sorts of radical design possibilities without smirking, without apologizing, without fear.

One could hardly sit through the discussions at the meetings, listen in on informal soirees of engineers in lobbies and rooms without coming away with a definite feeling that the automobile industry may be on the threshold of the most important period in practically applied design development which it has experienced since its early days.

Past Masters at the Helm Were There Strong

THROUGH the efforts of the Detroit Section which was host to the Society at dinner on Thursday evening, something close to a new record was made for assembling in one spot past presidents of the Society. Ten past chiefs together with incoming president, Vincent Bendix, were at the speaker's table. Here's who they were: Herbert W. Alden (1912 and 1923); Henry M. Leland (1914); J. G.

at the S. A. E. Meeting

Vincent (1920); David Beecroft (1921); B. B. Bachman (1922); T. J. Litle, Jr. (1926); J. H. Hunt (1927); W. G. Wall (1928); W. R. Strickland (1929); E. P. Warner (1930).

276 New Members Have Swelled the Ranks

MEMBERSHIP in the S.A.E. was greater by 276 members at the end of 1930 than at the end of 1929, annual report of the membership committee showed. Total now is 7499. Major increase was recorded in the full member grade where a gain of 170 took place.

Turned on the Yellow Stopped on the Red

BIG, working traffic lights signaling to speakers when to Go, get cautious and Stop were successfully introduced as an operating feature of the sessions this year by C. B. Veal, assistant general manager of the Society and staff representative on the meetings committee. The session chairman acted as traffic officer and the lights functioned tactfully, but definitely, in expediting the speakers and their discussions.

Buses and What They Are to Be—

ARE buses going to get bigger and more powerful or smaller and more agile? Bus engineers caught arguing this point between sessions expressed widely divergent opinions. Strengths in all units involved in power

transmissions constitute the major limiting factor in the race for more power in these big vehicles, one experienced engineer thinks, adding the view that legislative views about size and speed of buses may take decision on the question out of the hands of engineers in the end.

More power for low speed acceleration and pick-up on hills, rather than for high top speeds, in the opinion of several others, will continue to be demanded. Engineers might as well face the fact that they will have to meet that demand, this group feels, and might as well keep on staying awake nights trying to find out how to do it.

Good Engineering Talent Available—Buy Now!

THERE are scores of experienced, capable, high-grade automotive engineers out of work today. Some of them were at the annual S.A.E. meeting; more of them were not. Enough evidence appeared around the meeting's outskirts of further engineering department personnel reductions and changes, however, to emphasize the current availability of a large number of really good men.

Some factories certainly are going ahead, even while the axe continues to swing in others. To executives of those companies for whom business has turned the corner, a good look through the files of the S.A.E. employment department may easily

11 National Meetings

SOCIETY held 11 national meetings during 1930, report of national meetings committee showed. Advertising S.A.E. Journal decreased 148¾ pages for calendar year 1930, as compared to 1929, publications committee report stated.

John A. C. Warner Was Missed

JOHAN A. C. WARNER, general manager of the Society, was prevented from attendance at the meeting by his wife's serious illness.—N.G.S.

yield gold nuggets of excellent, available technical personnel.

Make your organization more effective! Check over the S.A.E. employment department records and see if the names don't generate in your mind some ideas of needed services to be performed in your own organization and of opportunities to get unusually competent men to perform them.

If you don't know just how the S.A.E. employment department works, write to them and they'll be glad to tell you. Or if it's any easier write to us and we'll be glad to pass your needs along to them and add any suggestions of our own which might seem to be helpful.

Automobile Show Opens at Chicago With Promise of Record Attendance

Greater public interest in new models, with 1931 prices practically unchanged, exhibitors at the Coliseum are enthusiastic for the Spring business

MANUFACTURERS of motor cars felt enthusiastic about the first and second days' attendance at the 31st National Chicago Automobile Show which opened Saturday in the Coliseum. Indications were that there would be a near-record attendance during the remainder of the show week.

The recently-announced Ford price cuts were not followed by other manufacturers. Prices, on the whole, have not been changed although several makers plan a few reductions on some of their models. Last year a number of factories announced reduced prices during the Chicago National Show.

January production will be 13 or 14 per cent larger than December, but 38 per cent lower than January, 1930, it would seem, from estimates made by a number of car company executives. Manufacturers were inclined to be cautious about estimating production schedules, feeling that the policy of gearing production down to dealer requirements should be continued. This plan was adopted rather generally in the industry last year.

Production Programs Geared to Demand

Several automobile factories have warned their supplier companies to be cautious in making operation plans for 1931, and have suggested that they not take the size of immediate releases as criteria of what to expect for the remainder of the year. This would seem to indicate that most factories are not sure just what 1931 holds for them.

On the other hand, one manufacturer has found it necessary to reassure supplier concerns that the releases placed immediately following the New York show were urgent. There has been some hesitancy on the part of component parts manufacturers to undertake increased production schedules without some special reassurance.

Several manufacturers confidently expect that their January production will hold up well, in spite of any general falling-off of totals.

It is believed at factory headquarters in the mid-town hotels that there is a far greater interest in new models this year than last. The public has been intrigued with several new mechanical developments, some new lines and curves and the recently-announced lowered prices. If willingness to buy follows the desire to see, sales should have a bright pickup during the first and second quarters.

One New Exhibitor

The De Vaux automobile, produced by the newly-organized De Vaux-Hall Motors Corp., is the only new passenger car shown at Chicago. It was announced during the New York show and was exhibited with two body models in one of the Michigan Avenue hotels.

Although there was reported some shift in the general picture of dealerships, most dealers throughout the country seem to have been sufficiently pleased with the 1931 offerings of their respective companies.

Factory sales executives report that their 1931 programs have had warm receptions at their dealer meetings. There seems to have been a general impression on the part of dealers that their factories have offered them the best values possible this year.

An interesting decorative scheme was worked out by the show committee in the Coliseum. Instead of using the usual floral-and-palm motifs, illuminated signs were used to "sell" the industry as a whole, giving some of the salient statistics about the automobile business.

Facts and figures thus shown were the cause of considerable comment on the part of the public as well as men who have been in the industry for many years.



H. Ledyard Towle

Looking Ahead a Few Years at the S. A. E. Body Session

by
Leslie
Peat

"Individually mounted lamps and other equipment that tends to develop wind resistance will disappear in the evolution of body design," says L. Clayton Hill + +

AN artist's conception of the automobile of the future stirred the Body Session of the Annual Meeting of the Society of Automotive Engineers Monday night into a lively discussion of problems of streamlining, putting the engine in the rear and building cars with more attention to comfort of the passengers.

H. Ledyard Towle, art director of Campbell, Ewald Co. and formerly with General Motors Corp., was the speaker. Those who joined in the discussion were commended by L. Clayton Hill, chairman, for "looking ahead a few years, instead of discussing where we are going to put the moldings next year when we are all waiting to see whose lines sell the best—and that is where they are going to be."

Those at the session generally agreed that we may expect to see higher top speeds on the open highways. Streamlining, especially with engines mounted in the rear and the entire vehicle designed on accurate streamlining with the bulbous portion at the front end, would eliminate the necessity for great increases in horsepower to attain higher top speeds.

"Our attempts at beautifying the things we make are based upon accident to a large extent," Mr. Towle said. "A thing comes into being because we want it to function; after that is accomplished we don't know quite where to go. We are living in an age which

the future may well call the 'American Renaissance.' It is a period in which we have accomplished the function of making things work, and we have come to the point where we are trying to beautify them.

"A peculiar thing about beauty is that when you make a thing that functions properly you have something that is beautiful—without trying to achieve beauty primarily."

Mr. Towle criticised the lines being shown in the 1931 exhibits as being too near the same thing in most cases. He said that unusual lines would, if basically beautiful, appeal to the public. "Manufacturers need not fear tying up large sums of money in new dies and equipment if their product is designed to be inherently a thing of beauty. The public can be told why the manufacturer has done this and that, and the public will accept the new style—as the public always has."

He pointed out that the automobile of today was a simple evolution of the buggy, with the engine mounted on the chassis instead of the tractive force being hitched out ahead of the frame. "From an artistic standpoint, a car designed along aerodynamic lines to more properly function at high speeds will automatically become more beautiful than the conventional, modernized buggies of today—evolved from a slow-moving vehicle," he said.

Automobile body designers, he said, will be forced to go outside of their immediate field and learn what craftsmen are doing in other industries. "One designing concern has been studying the work done in the furniture business. Designers visit the furniture marts and see if they can incorporate into their upholstery and fittings some of the ideas they see there."

The modern note in decorative art, according to Mr. Hill, is here to stay. Elements of art moderne are basically simple and lend themselves to use in

Beauty of the Utilitarian

There is no conflict between the utilitarian and the artistic. If the automobile of the future can best serve its function by having its engine in the rear, you may be sure that it will be a thing of beauty.—H. Ledyard Towle.

Nature is Rear-Engined

In nature we see ample evidence of the principle of "rear-engined" propulsion. Race horses, wolf hounds, whales and truck horses depend mostly on their rear-end power.— H. Ledyard Towle.

automobile interiors, he said. "I don't mean that the modern touch of the futuristic design can be applied to the lines of the vehicle itself, but certainly we can take something from the successful furniture designers who have used these motifs," he said.

"These things are going to live. They are going to grow on the American public. The so-called modernistic furniture was laughed at three years ago, but these lines are becoming to be pleasing to the eye, and they are going to be adopted on motor car interiors." But, he warned, designers of automobiles must "sneak up on the public" in using motifs moderne.

This is true in all developments of body design. When you try to do anything that is unusual or unconventional, you have got to 'sneak up' on the public."

"I, too, happen to be one of those who believe that automobile engines are going to be installed behind the passengers a generation from now. How we are going to sneak them back there, either underneath the car or over the top—without making the jump at one time—is beyond me. But there is certainly no reason why we should sit down behind that racket, behind all the odors and heat, and build a car backward as

we are doing today." Mr. Hill described in brief recent wind-tunnel tests* which, he said, proved conclusively that motor cars were being built with

the wrong end forward.

From his study of these results, Mr. Hill concluded that individually mounted lamps and other equipment that tends to develop wind resistance will disappear in the "evolution of the tear-drop design."

"These things," he said, "will be built into the car. We will gradually lead the public up to accepting this by first slipping the lamps into the radiator, then into the bonnet and finally the fenders into the lamps. Soon the public will see the whole front end of the car made as one streamlined unit. Then some day somebody is going to get nerve enough to turn the seats around and push the car the other way."

Joseph A. Anglada sees no additional safety hazard in increased top speeds of passenger cars. "Accidents rarely occur when a driver is going at a high rate of speed.

If you have noticed cars which have been in accidents, you will generally find that 99 per cent of the accidents have been caused by being hit on the right or left front quarter. Most of the accidents occur in city traffic, where speeds are low."



L. Clayton Hill

* Automotive Industries, Jan. 17, page 96.

Distillation of Coal in Germany

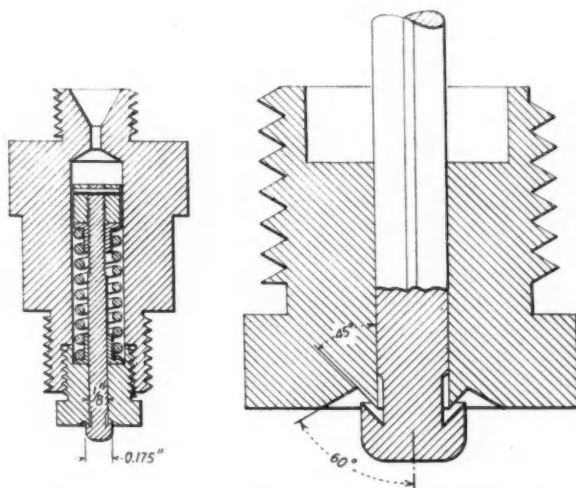
At the recent annual meeting of the German Society for Combustion Power Engineering (Brennkraft-technische Gesellschaft) Dr.-Ing. Thau spoke on The Present Engineering and Commercial Status of the Production of Power From Coal. He said that outside of the coal-gas and coke industries, which he was not considering, liquid fuels could be produced from solid fuels by either low-temperature distillation or by synthetically building up the liquid fuels. Low-temperature distillation of coal had not been able to secure a foothold in Germany, because a market for its by-product, low-temperature coke, was lacking, and the industry had disappeared entirely. The lignite low-temperature distillation industry, which was confined to central Germany, had developed new types of distilling ovens during the past decade. These ovens called for lignites having particular physical properties, but in compensation they assured a full yield of tar. No further installations have been made during the past six years, however.

The hydrogenation process is no longer being applied to coal, but only to oils, these latter being converted into volatile liquid hydrocarbon fuels by having hydrogen added chemically to their molecules. Benzol is still being purified in Germany by a process developed to meet the requirements of benzol for dyes. Modified process reducing the proportional washing loss has been extensively introduced outside of Germany, but the German benzol industry thus far has adhered to the old method in order not to jeopardize the market in any way. It is believed, however, that the washing method can be modified to reduce the losses without endangering the engines in which the fuels are being used in any way, and new specifications with that point in view are now being worked out. Efforts are being made also to develop a process for the production from coal tar of a fuel meeting all requirements of Diesel engines, and a prize competition has been arranged for the purpose.—*Automobiltechnische Zeitschrift*.

Aircraft Engine Session—

by
Athel F.
Denham

Hears that more accurate metering is possible with injection devices than with suction operated carburetors



Injection-valve assembly and enlarged details

Of opinions expressed by the aeronautical staff of the Massachusetts Institute of Technology, represented by C. F. Taylor, professor; E. S. Taylor, assistant professor, and G. L. Williams, research assistant, and the general trend of the discussion which followed their joint paper on "Fuel Injection With Spark Ignition in an Otto-Cycle Engine," are to be taken as a criterion, the day of the carburetor as an integral part of aircraft engines seems to be on the wane. According to the tests at M.I.T. described in this paper, fuel injection, whether directly into the cylinder or into the intake manifold, seems to have the advantage all around, and it is also worthy of comment that the discussion concerned itself not so much with "carburetors vs. fuel injectors" as with "what is the next step in working out fuel injection systems?"

Not that everyone was convinced that "the mechanical metering of small quantities of fuel at idling speeds presents no difficulties," as stated by C. F. Taylor, but there could be little doubt as to the general agreement that fuel injection presents ex-

tremely interesting possibilities for engine operating on a definite load to speed ratio.

The injection nozzle developed at M.I.T. for the test work, with its high pressure, apparently good atomization, and low penetration, came in for quite a little commendation. The possibility of obtaining stratification of the charge in the cylinder at low engine speeds, thereby bettering the fuel economy, was speculated on by both J. L. Goldthwaite of Allison Engineering, and Charles L. Lawrance, chairman of the session. This was contrary to the idea of the authors, who believed that with higher turbulence better economy would result at low speeds.

One suggestion made was that further tests be carried out, with fuel injection taking place closer to the ignition point. In the M.I.T. tests injection took place shortly after exhaust closing. J. O. Sherer, of Detroit, believed that higher effective compression ratios could be used with the later injection.

In answer to a question regarding the effectiveness of fuel injection in supercharged engines, C. F. Taylor pointed out that the injection pressure was sufficiently high so that supercharging pressures would make little difference. Other advantages claimed for the injection system by Mr. Taylor in his summary included freedom from manifold backfires and greater accuracy of fuel pumps as compared with carburetors. Mr. Taylor added that it might be interesting to try injection in two-cycle engines, as it would make possible scavenging with pure air. An increase in volumetric efficiency obtained with fuel injection was explained by the authors on the ground that the fuel injected just after exhaust closing cools the residual hot gases in the combustion chamber, thereby reducing their volume and decreasing the pressure in the cylinder near the beginning of the suction stroke.

A single-cylinder 5 by 7 in. N.A.C.A. universal test engine with an electric cradle dynamometer were used for the tests, together with other necessary

equipment. A special fuel injection valve had to be developed, due to the binding of valves designed for fuel oil injection when used with gasoline. Under high injection pressures this nozzle gives a high degree of atomization but very low penetration, since the fuel impinges almost perpendicularly on the face of a hollow cone. All tests were made at full throttle and 1500 r.p.m. with compression ratios varying from 3.5 to 5. Spark advance was maintained at 28 deg. Fuel was injected (a) directly into the top of the cylinder, (b) into the inlet pipe with the air stream, and (c) into the inlet pipe against the air stream.

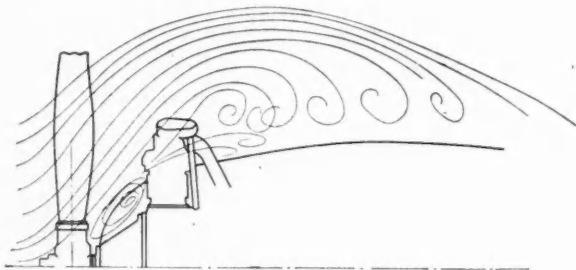
The conclusions arrived at by the authors include the following:

1. High pressure fuel injection either into the inlet pipe or into the cylinder is superior to carburetion in respect to performance. Maximum power may be increased by 7 to 11 per cent, depending on the method of injection. This increase is due partly to the elimination of the pressure drop through the carburetor and partly to direct effects of the spray itself. Improvement in specific fuel consumption may be traced to more even distribution of the fuel between successive cycles, and to a lesser extent to the higher mechanical efficiency which accompanies the gain in power. Acceleration is also improved. So are the idling and starting characteristics, the first probably due to elimination of lag, and the last as a result of the priming effect of fuel injection.

2. The highest useful compression ratios, as fixed by detonation characteristics, are essentially the same with injection of the fuel as with carburetion at the same volumetric efficiency.

3. The best power is obtained with injection of the fuel into the cylinder and the best fuel-consumption is obtained with injection with the inlet pipe against the air stream. The authors believe that good turbulence would reduce the fuel consumption with injection into the cylinder.

4. Fuel oil can be used as well as gasoline for injection into the cylinder, except for the more severe limitations upon useful compression ratio fixed by its detonation characteristics and its tendency to foul the plugs during the warming-up process.

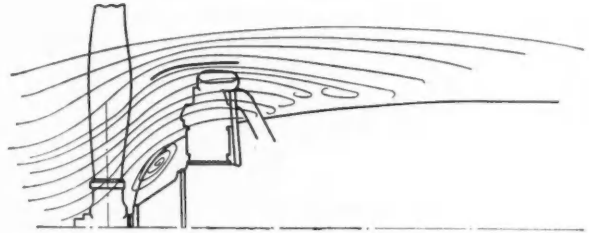


Probable flow of air over radial engine without cowl + + +

With gasoline injection it is important that lubrication be provided for the pump plunger and that close fits be avoided at sliding surfaces in the injection valve. In any practical application of fuel injection it would be necessary to regulate the air throttle and the fuel quantity control, but this could be accomplished over the useful speed-load range by a simple mechanical interconnection, for marine or aircraft work. For road vehicle applications the possible methods of control include: (a) modification

of the relation between throttle position and fuel-pump control operated by manifold vacuum or speed-controlled governor; (b) simultaneous hand control of the fuel pump and of a manifold-depression regulating valve; (c) manual control of either the fuel pump or throttle, with automatic control for the other element, and (d) simultaneous control of air-throttling and fuel-throttling valves.

Of substantially equal interest was the second topic of the aircraft engine session, which might be summarized as "how can radial air-cooled aircraft engines be further improved?" P. B. Taylor, chief engineer, Wright Aeronautical Corp., was the author of this paper, entitled "Increasing the Thrust Horsepower from Radial Air-Cooled Engines."



Probable air flow over radial engine with ring cowl + + +

Of particular interest in Mr. Taylor's paper was the remark, repeatedly made, that changing from a valve-in-head to an L-head design might go a long way toward helping the aircraft engine manufacturer over his difficulties. According to Mr. Taylor, not only would an L-head design permit a lower over-all diameter, and thereby reduce the drag and increase the effective thrust-horsepower, but cooling of the cylinder head would be improved, compensating valve-gears could be worked out more easily, and the results of researches on combustion chamber design carried on by Ricardo, Janeway, Whatmough and Taub could be applied to the aircraft engine.

The author was quite frank in his admission that the combustion chamber of the average air-cooled radial has been given practically no consideration from a detonation standpoint, the shape used being generally determined by valve sizes and locations.

Mr. Taylor's statement in his paper that, in spite of a somewhat general feeling that air-cooled radials did not offer any great possibilities for further increases in output, much remained to be done, was borne out rather strikingly. He had included in his paper a statement to the effect that the number of cylinders was limited to fourteen, but in the discussion he said he had been advised that an 18-cylinder radial air-cooled engine had been built.

Mr. Taylor voiced a feeling that, although seldom expressed, is probably general among aircraft engine manufacturers, when he said, "I am delighted that muffler development for aircraft engines is coming along slowly. If the exhaust should suddenly be quieted, all engines would be immediately grounded on account of the tremendous noise, such as piston clatter, supercharger gear noise, etc."

Roland Chilton, consulting engineer, Wright Aeronautical Corp., introduced the subject of fuels into the discussion, saying that aircraft engines now being rated at 300 hp. would be quite satisfactory developing 450 hp. if the proper fuels to make such operation possible were only available.

Transportation Session—

Learns that there is a trend toward smaller buses for city service and buses seating as few as five or seven passengers are predicted for the future

HOW big is the motor coach of the future going to be, especially that for city work? This was the question on which there was the widest difference of opinion at the Transportation Session on Wednesday morning. It is probably true that of late motor coach designers have laid the greatest stress on the development of large units, as John B. Walker of the Greyhound lines pointed out. D. W. Russell of the Southwestern Transportation Co., stated, however, that for city work, buses with seating capacities of 21 passengers, and even smaller, had been replacing 29-passenger and larger buses of late.

H. C. Edey of the Public Service Commission of New Jersey expressed surprise at this. He was of the opinion that larger units rather than smaller ones were needed for city work. On the other hand, Warner Tufts, chairman of the session, expressed the belief that buses with seating for as few as five or seven passengers would come into use in the future.

Both Mr. Walker and Mr. Russell discussed the same topic, viz.: "Future Requirements of Motor Coach Operators," and neither of the two speakers hesitated to state what he believed was really needed. The session, moreover, furnished answers to some of the needs propounded by the two speakers. For instance, a representative of Mitten Management, Philadelphia, in reply to a request by Mr. Russell for information on methods of waterproofing wood body parts, said his firm had been using a wood preservative suggested to them by the Brill Co., and had thereby doubled the life of wood parts, the preservative being especially effective in preventing dry-rot.

There seemed to be a tacit admission that engine powers for different sizes of vehicle were still being increased, in order that higher operating

speeds could be maintained, but there also was evident an undercurrent of feeling that it would be better if this were not necessary, as it would be reflected in higher operating costs. As an alternative, work on transmissions was suggested. Mr. Walker, for instance, referred to the "fluid-flywheel" with automatic gear changing developed by the Daimler company. A. F. Denham of *Automotive Industries* expressed the opinion that work on transmissions to obtain easy shifting under all conditions, and more silent operation in other than direct gear, would probably result in the use of smaller engines, and in operation of these engines at their most economical speeds. F. F. Chandler, Ross Gear & Tool Co., added that easier shifting and easier steering might perhaps be reflected in lower cost of "drivers."

Referring to a request by Mr. Russell for better headlights, R. H. Carlson, Westinghouse Lamp Co., stated that 32-cp. lights were now legal in all states except Connecticut, Nevada and the District of Columbia. Dirigible lights turning with the wheels are now also available as auxiliary equipment, but he felt that operators would not like to use these as standard headlight equipment. He also advised the introduction of reflecting devices to mark the outlines of motor coaches at night, as safety devices to use in conjunction with incandescent lamps.

A. J. Scaife, White Motor Co., said that perhaps he had now reached the point in the development of motor coach transportation where more attention could be given to detail development and servicing. Up to now, Mr. Scaife said, changes in design had been so rapid that the perfecting of any one design had been almost impossible. He referred to increased difficulties in gear-shifting with increase in power, as long as conventional transmission designs were adhered to. B. B. Bachman, Autocar Co., said that unless automatic gear-ratio changing were made available, power would have to go up, which would mean increased engine length, and less seating room, unless, of course, bearing lengths should be decreased, which was extremely unlikely.

John B. Walker of the Greyhound Lines read a paper on "Future Requirements of Motor Coach Operators," so in the final analysis the needs of the bus operator can be met only through close and intelligent cooperation with the manufacturer, and this is impossible if price competition is to continue. The ideal solution of the problem consists in the development of equipment that possesses greater riding comfort, has more appeal to the traveling public, and is easier and cheaper to maintain. Of the Greyhound management's maintenance



A. J. Scaife

dollar 49.51 cents goes for engine maintenance, 28 cents for the chassis and 19 cents for the body. The largest single item, 25 cents, is for engine material. Out of the operating dollar 14 cents goes for maintenance, 12 cents for gasoline, one cent for oil, 48½ cents for mechanics, etc., and 23 cents for "miscellaneous crew."

The extent to which engine power can be increased can best be answered by the engineers. However, as the horsepower/weight ratio increases, the cost of operation increases.

Oil cooling promises certain definite advantages to the operator. A device such as the Daimler fluid fly-wheel with self-changing gear equipment seems to be a move in the right direction. Something needs to be done to provide greater flexibility in the transmission.

Ten to 15 per cent of the total buses owned by motor carriers are held as reserve or stand-by equipment for replacements. Demountable engines in buses would reduce replacement tie-up. Longer life should be built into brakes. A more rugged clutch should be developed.

Light Alloys in Body Construction

Designers should not overlook the strides being made in the development and application of lightweight alloys to bodies. A body would last considerably longer also if all wood parts were waterproofed. Heating and ventilation requirements may lead to suction fans being installed at the rear of coaches. As to seating capacity, 29-passenger and larger models seem to lead in the intercity field. In city service, the 29-passenger type, which was the leader for five years, has been forced back into second place, the 21-passenger type now being slightly in the lead. Sales figures indicate development of larger vehicles for long haul intercity use. Although experiments are under way with Diesel and steam engines, permitting of the use of cheaper fuels, etc., it must be remembered that the operators have a tremendous investment in gas-engine-powered equipment, and in service facilities designed primarily for them.

D. W. Russell of the Southwestern Transportation Co. read a paper on the "Future Requirements of Motor Coach Operators." Directions in which motor coach design might be improved were given by the author. Following is a list of the major suggestions he made:

1. The motor coach should be designed and constructed as an individual unit, with each accessory, etc., located beforehand for maintenance.
2. Greater strength and quality of materials should be looked for even if slightly higher in weight and cost.
3. Non-glaring headlights to give visibility 500 ft. ahead, to penetrate fog, should be developed.
4. Instrument boards should be so located that instruments can be read by the driver without taking his eyes off the road.
5. Gas fumes still get into the motor coach. They should be kept out.
6. Some provision should be made to prevent the formation or sticking of sleet on the windshield, and included in the standard equipment.
7. As electrical accessories have been added, haphazard wiring has increased the chances of shorts, etc. This should be taken care of in the original design.
8. Further efforts are needed to reduce the carrying of motor noise into the motor coach.
9. Motor coaches are still subject to jars and jolts. Riding qualities can stand further improvement.
10. Lighting should be improved so that there will be no reflection on the windshield at night.
11. Motor coach weight should be decreased, possibly



J. C. Bennett

through the use of lighter alloys, to lower operating costs.

12. Utilization of the space now used for the engine would result in increased economy.

13. Shortening the drive line would help.

14. A coach capable of running on both rails and highways might prove of considerable value, since nearly all large operators are now directly or indirectly connected with railroads.

15. Frequency of brake service should be reduced.

16. The necessity for roadside tire changes should be reduced, especially

changes of inner rear tires on dual wheels.

17. The motor coach should be designed so that all of its component parts could be quickly removed and installed.

18. Parts should be standardized for interchangeability. Many so-called interchangeable parts are not really so.

The prime need, according to Mr. Russell, is to reduce the cost of operation, in order that the operators may effectively compete with rail lines when these, as is likely, lower their rates.

A NEW development in automobile wheels is a stainless steel artillery-type wheel developed by the Budd Wheel Co., of which the first samples were shown on a number of Pierce-Arrow cars at the recent New York Automobile Show. The term "artillery" wheel has been used in the past only in connection with wood wheels, but it will be understood that as used here it applies to a wheel of the general form of a wood-spoked wheel, pressed and welded up from sheet steel. It is stated that the new wheel weighs 6 lb. less "than any preceding one of its type" and that it has three times the lateral strength of a corresponding wood wheel. It is adapted equally to straight-side and drop-center rim construction. While the wheels made for the Pierce-Arrow cars were finished by polishing, the Budd company plans to later introduce the stainless steel artillery wheel for lacquer finish, hoping thus to produce a wheel finish that is just as durable as the body finish. These new Budd steel artillery wheels are interchangeable on the same hub with wire and disk wheels.

IN the course of a paper read recently before the Institution of Welding Engineers, C. C. Hall recommended the following solution for removing scale from "18 and 8" chrome-nickel steel:—Water, 50 parts by volume; hydrochloric acid 50 parts, nitric acid 5 parts, restrainer 0.25 part. The bath should be used at a temperature of about 50 deg. to 60 deg. Cent. About 15 minutes' immersion is required.

Production Session—

Criticised the system of allocating to the production department overhead costs resulting from the failure of management to predict production



E. F. Du Brul

NEW sparks flew from the age-old anvil of controversy—how should overhead burden be distributed to production departments?—when manufacturing and machine tool executives gathered at the Production Session and hammered away at the fallacies of commonly current accounting methods as

applied to factors controlling machine tool obsolescence and depreciation.

High overhead cost burdens, resulting from failure of management to predict production totals accurately in advance, should not be allocated to the production department and its equipment, most of the production men believe, but rather to some management controllable account where responsibility for the charge really lies. Distribution of burden to each production machine was urged, if necessary, to get a true cost picture for determination of obsolescence.

This latter element was touched on specifically in the paper on "Controlling Factors in Machine Tool Obsolescence," prepared by three experienced manufacturing men who have developed rather definite ideas through long years of automotive manufacturing operation. L. A. Blackburn, formerly superintendent of non-production departments at Oakland; J. W. Brussel, works manager of Timken-Detroit Axle Co., and A. R. Fors, planning manager of Continental Motors, were frank and specific in their comment on current practice when they said in this paper, read by Mr. Blackburn:

"In this age of transferring the burden of production from labor to machinery, the transferred labor gets its expression in burden costs through charges covering depreciation, interest, taxes, power, etc. Here again we must call upon management and the accountant for a distribution of burden to each pro-

duction center and to each machine if necessary, in proportion to its demand; and not by any process of spreading a general average burden over everything. Only by allocation of burden to the unit of production can we properly determine the obsolescence.

"How is it to be presented with so many of the facts averaged, or, worse still, confused with other conditions? It becomes quite complicated when the tool engineer presents his problem to management. He has the company policy regarding returns, burden, etc., and nine cases out of ten he will lose his case if he uses the burden from the cost department's setup."

Emphasizing that obsolescence must be given definite financial values if the manufacturer wants to avoid difficulties,



O. W. Boston

(Right)
C. J. Oxford



Torque, Thrust and Power in Drilling Representative Test Bars

Drill Diam- eter, In.	Actual R.P.M.	Feed, In. per Rev.	Torque, Lb.-Ft.		Torque Horse- power		Thrust, Lb.		Thrust Horse- power	Total Output, Hp.	Input, Kw.			Net Input, Hp.	Effi- ciency, Per Cent
			Test	Formula			Test	Formula			Gross	Tare	Net		
Final Test Results on Steel Bar No. 6, S.A.E. 6150 Steel															
1/2	444.5	0.009	14.0	13.43	1.185	725	678	0.00732	1.193	1.6	0.67	0.93	1.244	96	
5/8	368.0	0.011	22.3	23.4	1.562	838	990	0.00856	1.571	2.025	0.67	1.355	1.815	87	
3/4	299.7	0.012	34.3	34.8	1.957	1,269	1,273	0.01153	1.975	2.42	0.67	1.75	2.34	84	
1	228.1	0.013	62.4	62.4	2.71	1,862	1,820	0.01394	2.724	3.176	0.57	2.606	3.49	78	
1¼	175.1	0.015	110.8	104.0	3.694	2,430	2,520	0.01611	3.710	3.87	0.57	3.3	4.42	84	
1½	149.0	0.015	143.3	144.0	4.07	3,000	3,020	0.01693	4.087	4.837	0.507	4.0	5.35	76.5	
Final Test Results on Cast-Iron Bar No. 18															
1/2	446.0	0.009	6.3	5.6	0.535	530	436	0.00614	0.541	1.12	0.67	0.45	0.602	90	
5/8	364.4	0.011	10.2	9.9	0.708	645	615	0.00652	0.715	1.32	0.67	0.65	0.870	82	
3/4	299.7	0.012	15.7	15.05	0.896	803	778	0.00728	0.903	1.48	0.67	0.81	1.084	83	
1	229.8	0.013	27.9	28.1	1.221	1,088	1,088	0.00822	1.23	1.72	0.50	1.22	1.635	75.3	
1¼	179.4	0.015	46.4	47.8	1.585	1,403	1,481	0.00954	1.60	2.025	0.45	1.575	2.110	76	
1½	153.4	0.015	65.9	68.7	1.925	1,700	1,778	0.00988	1.94	2.27	0.37	1.90	2.550	76	

the authors went on to analyze four or five of the more important of the 25 or 30 formulae which have been developed by different individuals and companies to determine when a machine has outlived its economic value and finally concluded:

"We believe that there is much to be learned about machine tool obsolescence. It is not a problem that cannot be solved provided an adequate cost accounting system is set up that will provide the facts, which are sadly missing, and true costs which will make it comparatively easy to determine how much better the new machine has to be than the old."

The average overhead burden idea criticised by the authors was further excoriated in discussion by E. F. DuBrul, general manager, National Machine Tool Builders Association, who presided at the session, as well as by C. D. Oesterlein, president, Oesterlein Machine Tool Co., and others who participated.

Mr. Brussel added that the quicker the production man gets into this matter of allocation of overhead cost and gets the matter straightened out the better off he will be.

Frederick B. Heitkamp, general sales manager,

Cincinnati Milling Machine Co., made a plea for machine tool buyers to level out the higher peaks and valleys in the purchasing curve.

The paper on "Torque, Thrust and Power Values for Practical Use in Drilling Cast Iron and Steel," by O. W. Boston and C. J. Oxford, also presented at this session, was a final report giving actual figures for these values and supplementing a previous report covering the details of tests presented by these same authors at the annual meeting of the American Society of Mechanical Engineers in Dec., 1929. A resume of this previous paper appeared in *Automotive Industries*, of Dec. 14, 1929. Mr. Boston is a professor in the College of Engineering, University of Michigan, while Mr. Oxford is chief engineer of the National Twist Drill & Tool Co.

In their current paper, the authors presented actual figures for torque, thrust and power in representative test bars with drills ranging from 1/2 in. to 1 1/2 in. in diameter as shown in the accompanying table.

They developed also a number of empirical formulae for determining torque, thrust and power for general conditions of drilling.



J. W. Brussel



A. R. Fors



L. A. Blackburn

Chassis Session—



C. C. Carlton

SPEAKING at the Chassis Session on Thursday morning, R. K. Lee, of the Chrysler Corporation, urged upon engineers that when designing rubber parts for automobiles, they simplify mold requirements as much as possible, as

this makes for economy in manufacturing. Rubber manufacturers should be called in to help develop designs which will perform the required functions and be economical to manufacture at the same time.

The author pointed out that 650 different rubber parts and 88 different rubber specifications are used in the Chrysler lines of cars. Eight per cent of the total cost and 3.8 per cent of the weight of a Chrysler eight sedan is made up of rubber, he said. Mechanical rubber goods in the car weigh 38 lb.

In choosing the rubber stock for a given use the Chrysler laboratory is guided by requirements with respect to temperature and fixed compression loads, abrasion, mechanical deflection or deformation, proportions between movements and volume, appearance or finish, chemical reactions on rubber and of rubber on other parts, manufacturing procedure, dimensional variations and change of physical properties due to aging.

The high cost of molds for manufacturing rubber parts, the speaker said, had prevented a wider use of this material to date.

Tires and the Rim Riddle

The use of the drop-center-rim wire wheel is developing rapidly, B. J. Lemon, of the U. S. Rubber Co., Detroit, told the Chassis Session audience. "Some car engineers are feverishly testing equipment, while

The universal use of closed cars and need for flexible, non-squeaking doors indicate that molded rubber doors are an economic proposition. Doors could be so made as to allow for the molding-in of screw attachments for metal parts. Locks could be molded in place.

Molding of rubber roof and door parts might result in savings of labor costs.—Colin Macbeth, Birmingham, Eng., consulting engineer, in a letter of comment on Mr. Lee's paper.

others are changing over without giving much attention to testing," he said.

"Aside from appearance, cost, ease of rolling the rim and other commercial aspects, two factors will decide for the car owner whether drop-center rims and tires are better or worse than flat-base rims and tires.

"One of these factors is whether an improvement over the flat-base rim has been accomplished in applying and dismounting tires to drop-center rims. The other is the service and the safety of the drop-center tire itself. It seems that the knack of putting on tires and taking them off is one that can be acquired quickly, although until it is acquired one

"In England and in America, those who have had widest experience with the drop-center rims are generally unanimous in their statements that there is no more risk in using drop-center rims than in using the flat-base rim, from the viewpoint of deflated tires coming off and wrecking the car.

"English racing drivers have used drop-center rims without rim fillers. More than 5,000,000 American cars have been made with drop-center rims, and there seems to be no serious problem of tire-throwing from these rims, even with the deeper well-depths used in past production."



B. J. Lemon

Engine Session—

Learns much regarding the fundamental of torsional vibration damper application to crankshafts



Alex Taub

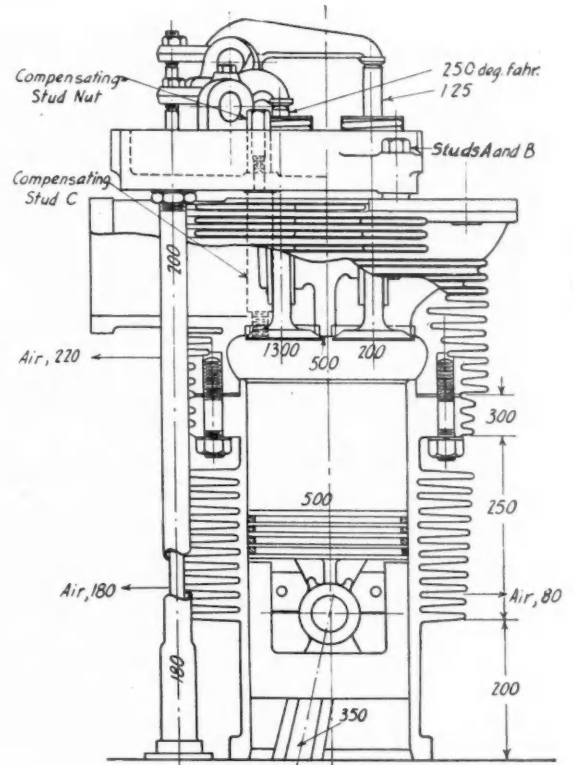
It has been quite some time since a paper on the development of a design, presented before the Society of Automotive Engineers, recorded so frankly the mistakes, trials and tribulations of the designers as did the paper by E. S. Marks, chief engineer, and C. T. Doman, research engineer, H. H. Franklin Mfg. Co. This paper, entitled "Development of the Franklin Air-Cooled Engine," to-

gether with a paper on Torsional Vibration Dampers, by J. G. Baker and J. P. Den Hartog, research engineers, Westinghouse Electric & Mfg. Co., was presented at the Engine Session on Monday afternoon.

Perhaps it was the frankness of the authors, perhaps the capable chairmanship of Alex Taub, Chevrolet Motor Car Co., but probably both, that was responsible for the reciprocal frankness in the discussion. At any rate, it certainly was interesting to hear Roy Cram, Chevrolet assistant chief engineer, recount his company's failure in their experiments with air-cooled engines some years ago. It was amusing to hear Mr. Doman in his and Mr. Marks' paper tell how in one of their theoretically "improved" engine designs "cylinder-head gaskets could not be kept tight; valve clearance varied from five to fifty thousandths, the cylinder barrel became hot and distorted around the intake valve, and the cooling fan required excessive power to push the necessary air through the restricted passages." It was rather surprising to hear sev-



J. G. Baker



Maximum temperature reached by various parts of the Franklin cylinder + + +

eral representatives of passenger car manufacturers using water-cooled engines admit that they had no idea how much power a fan on one of their jobs actually absorbs.

It is hardly necessary to recount here the improvements made in the Franklin engine, which formed the basic topic of the Marks and Doman paper, as these were covered rather extensively in the Nov. 8 issue of *Automotive Industries*.

Messrs. Baker and Den Hartog's paper, together with prepared discussions by R. K. Lee of the Chrysler Corp. and Thomas C. Van Degriest of the General Motors Research Laboratories, presented a summary of the fundamentals of torsional vibration damper application to crankshafts. A point emphasized by the authors was that a simple dynamic damper does not improve conditions when applied to a variable-speed engine, for while it reduces the torsional vibration at the speed for which it is adjusted, it increases the amplitudes of the deflection at speeds slightly lower

(Turn to page 173, please)

Detonation Symposium—

by
A. Ludlow
Clayden

Adopts the method of rating the anti-knock quality of fuels by octane number in which they were joined by the Institute of Petroleum Technologists of England



D. B. Brooks

FOLLOWING the recommendation made last summer by the Cooperative Motor Fuels Research Committee, the S.A.E. has adopted the method of rating the anti-knock quality of motor fuels by octane number. The octane number is the percentage of iso-octane in a mixture of this material with normal heptane necessary to match the detonation performance of the motor fuel sample. Of course, this is only one step, as it is

further necessary to specify the conditions of test so that reasonably good check results will be obtainable by different people in different places. It is the object of the sub-committee representing the automotive and oil industries to arrive as soon as possible at a standard engine and standard method of operation, and a great deal of progress in this direction has been made. The complete solution is quite difficult, because of the very large number of factors involved. The design of an engine satisfactory from a strength and durability viewpoint may be said to be complete today. The committee engine, of which a number have been built and distributed, has proved highly satisfactory, and it is unlikely that more than a few very minor changes will be made in it. We are now at the point where the technique of operation is the main thing still requiring decision.

The detonation symposium consisted of a group of papers

dealing mainly with specific details affecting the technique. A very encouraging factor in this detonation study has been the thorough cooperation by the British petroleum industry. At the symposium meeting, three British representatives, R. Stansfield of the Anglo Persian Oil Co., C. H. Barton of the Asiatic Petroleum Co., and C. H. Sprague of the Anglo American Oil Co., each presented a short paper, and Mr. Stansfield made the official announcement that the Institute of Petroleum Technologists, which in England corresponds to the A.P.I. in this country, has agreed to use the octane-

number method of rating and has, furthermore, approved the committee test engine.

The British speakers dealt with some details of operation which their work had shown to require accurate specification, including the bouncing-pin adjustment, a standard design of spark plug, and methods necessary when testing in the committee engine, fuels intended for air-cooled aircraft engines.

Cylinder wall temperature is an important factor in knock rating. Fuels which have the same knock characteristic with a jacket and cylinder head temperature of 212 deg., may be quite different if tested at 300 deg. Also, the dimensions of the engine are a factor, and it is necessary to decide whether tests made in a small-bore engine can be conducted under



Dr. Graham Edgar



H. L. Horning



R. Stansfield



Neil MacCough



C. H. Barton



J. B. Hill

conditions which will give a true picture of how those fuels would act in a much larger cylinder. A discussion on this particular phase of the subject, which was participated in by S. B. Heron of the U. S. Army, indicated that satisfactory estimation of the knock qualities of aviation fuels could be made by running the committee engine at a somewhat higher speed, and, of course, using some cooling fluid other than water, which would permit operation at high temperatures. Temperature can be handled very nicely by using such fluids, and the effect of size apparently can be simulated by choosing a satisfactory speed.

Knock ratings are very considerably affected both by spark timing and by mixture ratio. A variety of methods can be suggested for standardizing these two adjustments, but from the evidence presented at the symposium, it seems reasonably certain that the mixture ratio or carburetor adjustment should be that producing maximum knock and the spark setting that suitable for maximum power. Both these adjustments are very easily made. An automobile or aircraft engine usually does have a spark setting intended to be that for maximum power, and while the carburetor setting may not be that for maximum knock at all speeds and loads, the probability is that somewhere in the range it will produce such a mixture.

Another very important detail is that of compression ratio. Fuels which match each other at a particular compression ratio may not do so at a different one, all other adjustments being as nearly as possible equal. There is good reason to believe that the temperature of the charge at the time of ignition, which, of course, is varied by changing the compression ratio, is the real factor causing differences in rating. Here again it appears that when testing the same fuels at different compression ratios, the closest correspondence is obtained by using the mixture for maximum knock and the spark adjustment for maximum power.

Two of the papers are outstanding as indicating how very thoroughly the committee is going into the subject. D. B. Brooks, N. R. White and G. C.

Rogers presented data on an exhaustive study of the effect of humidity and intake-air temperature. When making up standard fuels of known octane number, owing to the scarcity of heptane, it will be essential that most of the actual test work be done with gasoline made up in fairly large quantities, to have some precise octane number. The paper just mentioned showed that air temperature and humidity affects some kinds of fuel more than others, indicating that certain sorts of base fuels would probably be better suited than others

(Turn to page 172, please)



D. P. Barnard



R. E. Wilson

Diesel Engine Session—

Brought forth an interesting discussion of problems
in the light high-speed type of powerplant

TWO sessions were devoted to Diesel Engines, one on Thursday, the other on Friday. While O. D. Treiber, chairman of the Thursday session, had no difficulty in bringing the session to an end within a reasonable time, W. F. Joachim, chairman of the Friday session, had to call an end to the extended discussion, although only two papers were scheduled. Thursday there was a paper on Combustion Problems and Design of High-Speed Light-Weight Diesel Engines, by E. F. Ruehl of I. P. Morrison & DeLaVergne, Inc., and one on Operation and Maintenance of Diesel-Engined Motor Coaches, by A. A. Lyman, Public Service Coordinated Transport. Friday's papers were on Compression-Ignition Engine Research, by E. T. Vincent, Continental Motors Corp., and A Survey of Mobile-Type Diesel Engines, by C. G. A. Rosen, Caterpillar Tractor Co.

On Thursday the discussion centered more around details of design, while Friday's discussion dealt extensively with the Diesel engine as a whole, especially in its relation to other types of powerplant.

It would be rather difficult to pick any one major point brought out in the discussion, unless it be the admission by several engineers associated with Diesel-engine development that knowledge of what goes on in a compression-ignition engine, its nozzles, pumps, etc., is sadly insufficient.

Mr. Treiber, for instance, said that more information was needed on the thermodynamics of Diesels. O. F. Allen of the General Electric Co. said that existing pumps are not adequate for high-speed fuel injection. Higher-speed pumps, he felt, must be developed. Mr. Cook of Robert Bosch Magneto Co. expressed the opinion that the most important thing right now is the initiation of a program of combustion research.

J. L. Goldthwaite, Allison Engineering Co., claimed that nobody knows anything about what goes on during combustion, in a pump, or in an injection system. He characterized the following of preconceived notions unsound. "We would be better off," Mr. Goldthwaite stated, "if, for instance, we had never heard of 'expansion' in an injection system under pressure. We worry a lot about it, but it is mostly theoretical worrying."

The need for an indicator which will record Diesel pressures accurately was also voiced by Mr. Gold-

thwaite, who stated that errors in indicator cards on Diesels ran as high as 75 per cent.

Mr. Vincent caustically remarked that little change had been made in the principles of design of Diesel engines since 1890. He also emphasized the importance of combustion control.

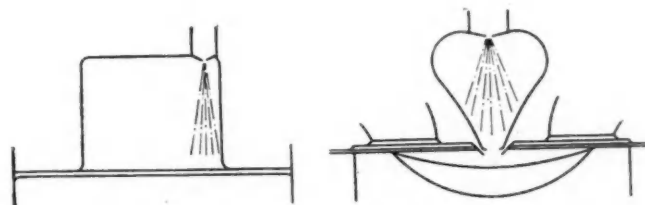
Directly opposed to this criticism of the Diesel engine were numerous references in the discussion and in the papers to interesting Diesel developments and operations. Mr. Vincent himself said that he had operated a low-speed Diesel at 130 lb. b.m.e.p., with a maximum pressure of only 650 lb., 10 hours a day for six days. Mr. Treiber talked about foreign Diesel engines running at around 3000 r.p.m. experimentally. Mr. Sandell of the Sandell Motor Co. told about his two-cycle fuel-injection development. This is a four-cylinder, inverted V, air-cooled aircraft engine, supercharged, with a bore and stroke of $4\frac{1}{4}$ by $5\frac{1}{4}$ in. The best performance so far, he said, was 175 hp. at 1650 r.p.m., but he hoped to get 230 hp. at 1800 r.p.m.

Brooks Walker mentioned that he had been working with electrically controlled injection valves, a statement that was received with interest. Other Diesel types briefly described included a four-cylinder engine developing 70 hp. at 1250

r.p.m., the feature of which seemed to be that the fuel spray splits, part going into the main chamber and part going into a "reserve" chamber. This engine weighs 16-18 lb. per hp., it was stated.

Mr. Allen stated that over 1000 Diesel-engined buses were in operation in Europe, and that in some cities the entire truck system was Diesel-operated. L. F. Burger, International Harvester Corp., in discussing some statements made in Mr. Ruehl's paper, said that you could do almost anything with a Diesel if you had the right kind of a pump. J. O. Shere of Detroit felt that with proper design, open nozzles do not suffer from the breathing problem. Mr. Treiber said that possibly the success of Ricardo was due to the fact that in his turbulent engine the air is always wiping off the nose of the nozzle at the beginning and end of injection.

Other points were brought out in profuse number. W. F. Joachim of Westinghouse Electric & Mfg. Co. felt that the "solid" core in the center of the spray



Types of Diesel engine combustion-chamber design
for control of combustion + + + + +

must be eliminated for better combustion characteristics, volatilization, etc. Mr. Vincent did not agree that vaporization had much to do with the subject. He said there was every evidence that combustion was direct from the surface of the fuel particle.

The usual discussion arose as to whether the mechanical design of Diesels should be made to fit existing fuels or whether the petroleum industry should develop special fuels for Diesel engines. Mr. Vincent was one of the engineers who aligned themselves with the fuel men in their contention that for maximum economy Diesels should be designed to operate on existing fuels. He said injection systems should have as wide a potential fuel range as possible, and in this he was supported by quite a number of Diesel engineers. Mr. Butler of the Standard Oil Co. of New Jersey counseled Diesel engineers that they might as well make up their minds that the fuels they would have to use would be subject to detonation and ignition lag.

Design Considerations

In his paper on Combustion and Design Problems of Light, High-Speed Diesel Engines, E. F. Ruehl considered Diesel engines ranging in bore from 4 to 10 in. and having piston speeds of 1200 ft. per min. or higher. He had prepared two tables in which the weights, speeds and powers of representative commercial Diesel and gasoline engines were compared. Some of the smaller Diesel engines compared favorably with gasoline engines with respect to specific output, but the majority of the Diesels were unnecessarily heavy, according to the author.

Mr. Ruehl said maximum combustion pressures higher than 700 to 750 lb. per sq. in., or about 60 per cent higher than those of modern gasoline engines, are not necessary for high mean effective pressure and high fuel economy. Crankshafts will have to weigh about 10 per cent more; connecting rods, 20 per cent, and frame and cylinder heads, 30 per cent, for the same material. A weight increase of 15 to 25 per cent, therefore, seems to be all that is needed to compensate for the effects of higher gas pressures.

The limit on power increase through an increase in speed is set by the natural breathing capacity, or volumetric efficiency. This limitation can be overcome by supercharging.

Combustion control is the essential problem which influences the whole design. The solution depends on the selection of the type and form of the combustion chamber and of the fuel injection system.

The single-chamber type offers the simplest and most efficient solution to combustion and heat-control problems under variable conditions, giving the highest mean effective pressure and making starting easy.

The ante-chamber type results in much greater heat losses during compression and combustion. It has inherently lower mean effective pressures, and requires a higher compression ratio for starting from cold. It is less sensitive to the use of the heavier grades of fuel and does not require such high injection pressures, which latter are detrimental to the life of the pump.

The author then discussed the combustion chamber and spray forms of the Packard, M.A.N.-Buda, Ricardo, Hesselman, and DeLaVergne engines.

There are two systems that fulfill the requirements of quickly injecting small quantities of fuel at high pressure, the common rail and the individual cam-driven fuel pump for each cylinder. The fuel pump is now in a similar state of development as were carburetors, spark plugs and magnetos during the early

years of the automobile industry. Standardization work naturally has been concentrated on the individual pump system.

There has been much controversy regarding the relative merits of open and closed nozzles. The more simple open nozzle is unsuitable for variable-speed engines, because the injection pressure varies with the square of the speed. After-dripping of fuel also occurs.

The paper also discussed available structural materials and their heat limitations, the design of cylinder heads and valves, cylinders, liners, aluminum pistons, etc. Heavy carbon steel crankshafts are recommended, with the crankpin diameter preferably two-thirds the size of the cylinder bore.

An efficient cooler for the lubricating oil is necessary in high-speed Diesels. A pv factor of 20,000 is given as safe for pressure-lubricated main bearings.

In his Survey of Mobile-Type Diesel Engines, C. G. A. Rosen said the mobile-type Diesel engine should burn available fuels of a fairly wide range of characteristics. Although Diesel engines have been built for more than 30 years, the designer has been influenced by speculation in laying down designs and has resorted to cut-and-try methods of development.

For simple construction the open-nozzle injector holds first place. The simplicity, however, throws added burdens of responsibility on the fuel pump. The mechanically controlled fuel valve has operating advantages in that means are available to the operator for the control of flow at the last point in the system.

The automatic type of closed fuel valve probably is an acceptable compromise, provided its associated fuel pump is in tune with it at all loads and speeds.

Design of the fuel pump goes hand in hand with that of the injector. Functions of the fuel pump should be kept down to a minimum and its efficiency as a metering device is well established. As regards combustion chambers, form A (see illustration) is superior from the starting point of view, while form B can be idled down to lower speeds.

If its combustion efficiency is sufficiently high to assure low running cost, together with reliability on average fuels, the low-compression oil engine has a chance in types designed for speeds above 1000 r.p.m., as this field lacks serious Diesel competition. Considerations of fuel economy and service requirements favor the high-compression Diesel below 1100 r.p.m. Lower operating cost, superior lugging characteristics and a simpler and more positive fuel system assure its future.

In Bus Service

L. A. Lyman in his paper said that his company in 1928 decided to equip a motor coach with a Diesel engine, both for experimental operation and for use in regular service. Three types of foreign Diesel engines had been imported by the company up to the present, and used one after another in a Diesel-electric bus. One interesting result was that there is practically no carbon monoxide in the exhaust, so that Diesel-powered vehicles are preferable from the public health standpoint. Another advantage is the elimination of fuel loss by evaporation in storage and handling.

Trouble experienced with the fuel equipment usually has been due to air in the injection pipes, which compresses and prevents opening of the nozzle valves, thus resulting in "missing" and loss of power. This usually is due to a leak in the fuel suction line, faulty fuel supply to the injection pump, or failure of mechanics to relieve the air in the system after being opened.

Fuel and Lubricant Session—

Find that in general the characteristics of hydrogenated oils have a tendency to combine qualities of lubricants of different basic types



H. C. Mougey

taken care of by the production of higher quality lubricants, and this may have been to some extent fostered by the salesmen of the oil industry.

The basic fact is that when the oil temperature is kept reasonably low, the durability of the engine is likely to be very much greater than when the temperature is allowed to run very high, the quality of the oil being a comparatively insignificant item. Since the viscosity of oil varies a very great deal with temperature, it has become almost impossible to provide any kind of lubricant which will give really easy starting in cold weather and yet have sufficient viscosity to be safe at the very high temperatures which can be reached in high-speed winter driving.

The first point made by the author was that the strength of babbitt metal decreases very rapidly as temperature rises. The liability of bearings to crack is much greater at 300 deg. than it is at 200 deg.

There are two possible ways of controlling oil temperature. One consists in circulating the oil through an air-cooled radiator; the other in passing it through a heat exchanger having the oil on one side and the cooling water on the other. Mr. Ramsaur's paper brought out the advantages of the latter system very conspicuously. In talking of oil cooling, we are considering only

A VERY important paper was that on Oil Cooling and Oil Coolers by W. R. Ramsaur. There has probably been an impression among engineers that the main advantage of oil cooling was that it made conditions easier for the oil. Along with this idea has gone the impression that the matter could be perfectly well

one phase of the subject. Where oil temperature is controlled by the cooling water, not only are excessive maximum temperatures prevented, but cold oil is warmed up much faster, which is a great advantage to the engine in cold weather. The paper deals exhaustively with different cooling arrangements, showing the results obtainable by different rates of flow of oil, air and water. In the discussion the author was very strongly supported by Alex Taub, who said that he regarded oil coolers as now absolutely essential, and Mr. Mougey placed special emphasis on his conviction that it was just as important to warm oil when starting from extreme cold as it was to prevent it rising to excessive temperatures.

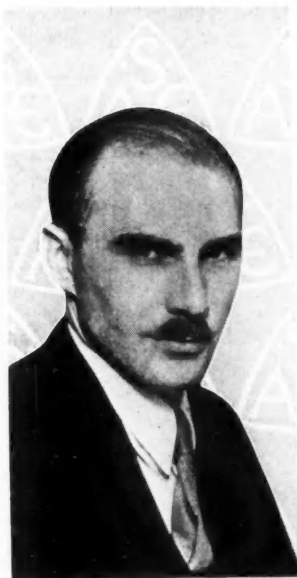
C. N. Larson in his paper on Classifying Transmission Lubricants described instruments designed for testing various

qualities of these materials. In introducing the speaker, Mr. Mougey pointed out that the general practice of the automobile industry in using straight oils for transmissions and rear axles was due not to any doubt as to the qualities of compounded lubricants but to the impossibility of specifying or classifying fluid greases which might be actually better lubricants than the straight oils. Larson's paper showed that with satisfactory instruments this difficulty will be overcome.

There are several different qualities necessary in transmission lubricants. At the low temperature end they should be reasonably fluid, which means ease of shifting, freedom from channelling, and, therefore, assurance of good lubrication; while at the hot end the lubricant should have adhesive properties and sufficient body to minimize loss from leakage. The instru-



W. C. Bauer



W. R. Ramsaur



C. M. Larson

ments he has developed enable accurate measurements to be made of viscosities and of adhesiveness over the whole range of temperatures encountered in practice.

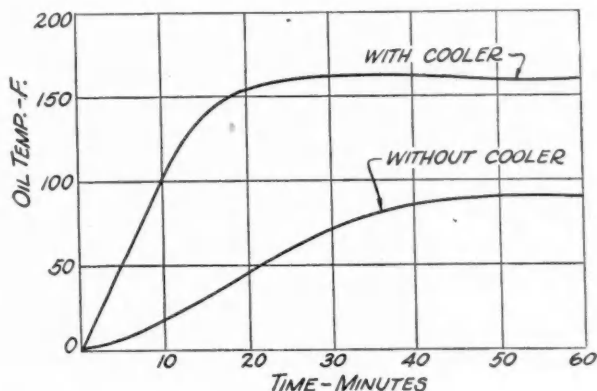
The paper is mainly of interest to makers of lubricants. Some data are given on tests similar to those conducted by General Motors and the Timken company on lubricants containing lead soaps and sulphur for conditions of very high pressure. Briefly stated, the conclusions expressed are that for general gear lubrication, fluid greases are desirable, because they have high viscosities at

high temperatures and much lower viscosities than corresponding straight oils at low temperatures. Further, that for hypoid gears the pressures are too great for fluid film lubrication to be maintained with straight oils and that compounds are required having a very high film strength.

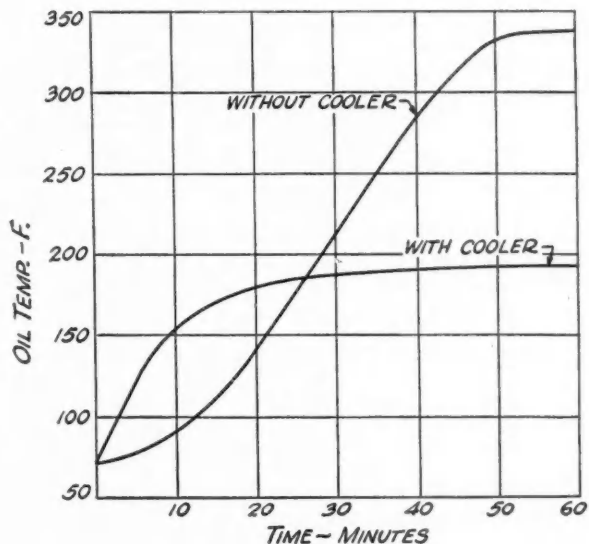
Undoubtedly, many more people have heard the term Hydrogenation than had the least idea as to what it meant. Dr. R. T. Haslam and Mr. W. C. Bauer described some of the outstanding characteristics of gasoline and lubricating oils made by the hydrogenation process. All petroleum products are compositions of carbon and hydrogen. The hydrogenation process enables the relative proportions of these two elements to be varied within much wider limits than is possible in conventional refining. Anti-knock gasolines require a large ratio of carbon to hydrogen. By the hydrogenation process a gasoline can be produced from any particular crude containing proportionately less hydrogen than it would if made by ordinary distillation. A particularly interesting phase of this subject is that the anti-knock quality of a gasoline produced in this way is apparently distributed more equally between the

constituents. If a gasoline is divided by distillation into a series of fractions, on the average the lighter fractions will show the highest anti-knock rating. In a sense, the anti-knock quality of a conventional gasoline may be said to lie mainly in its lighter constituents. With some hydrogenated products this is not the case, the heavier fractions showing approximately the same rating as the lighter fractions.

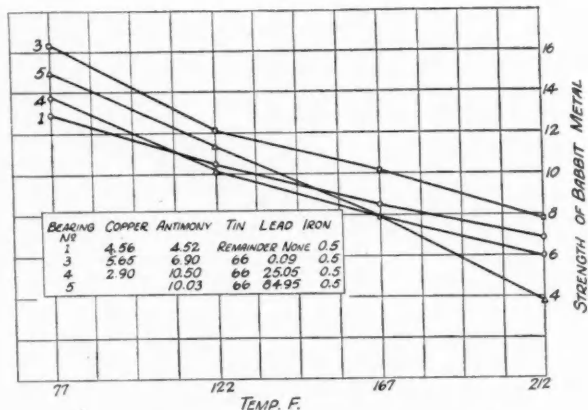
In the production of lubricating oils the work described by Dr. Haslam was mainly in the opposite direction, that of increasing the proportion of hydrogen to carbon. By this method it is possible to make



Oil temperature rise in traffic operation in winter + + + + +



Oil temperature rise in hard driving in summer + + + + +



Effect of temperature on strength of Babbitt metal + + + + +

lubricants of high boiling point, low carbon-forming tendency and low pour test from crudes which would not ordinarily furnish lubricants of such character. In general, the characteristics of hydrogenated oils have a tendency to combine the qualities of lubricants of different basic types.

General Development Session—



E. S. Marks

THAT steadiness of nerves is less after taking an automobile ride than before is one of the conclusions developed by Ammon Swope, associate professor of industrial education, Purdue University, through a series of tests made with his "Steadiness Meter," an instrument designed for the purpose of finding some objective means of

measuring nervous reaction of a subject under controlled conditions.

Records obtained covering normal riding and driving conditions for 160 person-trips indicated nothing conclusive regarding the relationship between total miles traveled, speed and the readings on the meter, but did indicate that total miles traveled has a marked influence on the meter readings.

Mr. Swope found, as a result of his extensive tests, that there is a marked difference in the individual records and that mental attitude—whether the driver is trying to "make time" or not—is an important factor in riding in or driving an automobile.

No significant relationship was developed, however, between speed and the readings on the "Steadiness Meter."

The "Steadiness Meter" consists of a cabinet approximately 5 by 6 by 9 in., with a brass plate attached to the upper part at an angle of 30 deg. from the vertical. Through the plate, in two horizontal rows, are drilled a succession of holes ranging from $\frac{3}{4}$ in. to $\frac{1}{8}$ in. in diameter. The diameter of each hole is $\frac{1}{32}$ in. smaller than the preceding one. These holes are numbered as follows: 0, 1, 2, 3, 4 20. A stylus $\frac{3}{32}$ in. in diameter and 8 in. long, including handle, is attached to a flexible electric cord in circuit with a dry cell, an electric buzzer and the brass plate. The dry cell and buzzer are mounted inside the cabinet.

The subject uses the instrument by inserting the stylus successively in each hole, beginning with the largest and moving forward at the rate of about one hole per second. In inserting the stylus it is pushed in to a back stop at the depth of 1 in., the operator being careful not to touch the brass plate. Should he touch the plate, a buzzer inside the cabinet rings and

Learns that attractive and durable plated finishes can now be applied to zinc alloys without difficulty

the number below the hole where contact is made is recorded as his score.

In his paper Mr. Swope outlined details concerning the methods and equipment used in making these practical riding tests with the "Steadiness Meter" and presented quantitative data developed in great detail and volume.

"There has been as much improvement in zinc alloys for die-casting since 1914 as there has been in the general design and production of the automobile," Robert M. Curts, engineer, New Jersey Zinc Co., said in his paper on "Zinc and Zinc-Alloy Use in the Automotive Industry." Then he went on to detail these particular improvements along with a number of other zinc applications in automotive processes, presenting, before he finished, a fine array of factual information, much of which had been familiar to a majority of the engineers in his audience only in a general way.

Among the newer processes sketched by Mr. Curts was the development of new alloys for rolling and the bringing to fruition of a plating technique which results in the deposition of tough, dense, adherent coatings on zinc or zinc-alloy surfaces.

This latter development, he said, has been the most important contributing factor to increased use of ordinary commercial rolled zinc for cowl, drip and splash-guard moldings, truck rack and gasoline tank trim, gasoline tank and radiator caps, switch plates, flexible cables, dome lamps, ash receivers, engraved instrument panels and running-board moldings.

Ductile, relatively soft extruded zinc shapes, he said, have recently been made available for drip and body molding, while there has been an appreciable increase in the use of zinc in brake lining manufacture.

Fully automatic machines are now being used, Mr. Curts said, in making zinc-alloy "pressure" die-castings.

Where proper lubricants can be used and where loads are reasonable, Mr. Curts believes that die-cast gears made from zinc alloys merit consideration. A large tonnage of zinc alloys is consumed in the manufacture of automobile body hardware, he stated, going on to point out that improvement has been made in zinc alloys even during the past year.

A new alloy on which a patent recently was granted, he stated, contains approximately 4 per cent of aluminum, 0.1 per cent of magnesium and 95.9 per cent of high-purity zinc. This alloy has about 25 per cent less tensile strength than the 4-3-0.1 alloy, but seems to be better in impact strength and apparently undergoes less dimensional change upon aging. While its

(Turn to page 172, please)

Fuel Research Session—

Learns that the bulk of vapor lock troubles are due to high temperature of the fuel on the intake side of the pump and are controllable to a great extent



J. B. Macauley

THE two papers presented on Tuesday morning showed very strongly the great scope of the work done by the Bureau of Standards. The paper read by Miss E. W. Aldrich on Methods for Determining the Gum Content in Gasoline may be classified as a purely scientific study, covering one

phase of a complicated subject from a strictly laboratory point of view. The other paper, by Dr. O. C. Bridgeman and H. S. White, on Temperatures in Fuel Lines, is a survey of current practice with direct application to engineering design.

Work done on this latter subject at the bureau during the past year was undertaken to solve a problem of vital importance to the oil industry and the automobile user. There has been a certain amount of real trouble due to gasoline boiling at some point between the tank and the carburetor causing a reduction or even complete stoppage of flow. Obviously, in feeding a volatile liquid to a system of tanks, pipes and pumps, limitations must be placed both on the possible temperatures in the system and on the volatility of the fuel. Users are anxious to have fuels of high volatility to provide easy starting and minimum crankcase dilution. The limiting factor is obviously the maximum temperature likely to be reached at any point in the fuel system. The bureau study covering practically all types of road vehicles and aircraft has clarified this subject.

The striking thing in the fuel line temperature survey is the very great variation between different vehicles. The temperature of gasoline in the main tank is always a little above atmosphere after the car has been running for a time. There is then usually a rise between the main tank and the fuel pump or vacuum tank, a further rise in passage through these instruments, and in some cases a still further rise on entering the carburetor. Roughly, it may be said that the bulk of vapor lock troubles

occur due to the temperature of the fuel being too high on the intake side of the pump. This is controllable to a great extent by the location of the fuel line relative to the exhaust pipe and by the provision of a draft of cooling air for the fuel pump.

It was found that the average rise of temperature between the main tank and fuel pump or vacuum tank inlet was 29 deg., the maximum being 49 deg. and the minimum 10 deg. On the outlet side, the average was 41 deg., the maximum 73 deg. and the minimum 20 deg., these values being taken from a large number of cars at 40 m.p.h. Obviously, the car in which the fuel temperature rises only 20 deg. can utilize very much more volatile gasoline than the car in which it rises over 70 deg. In fact, in the latter case it will be very difficult to use a really easy-starting fuel. This condition is made all the more severe by the fact that the temperatures under the hood are not necessarily very much lower in winter than in summer.

The problem of gum in gasoline is new in a sense. Gasolines of high anti-knock quality have a chemical constitution which favors the formation of gum.

A certain amount is quite harmless, but too much is liable to interfere with the action of intake valves and carburetor parts. At present there is no satisfactory method of determining the gum content of any gasoline. The discussion of this paper, however, made it very clear that the old method of determining gum by evaporating gasoline in a copper dish is absolutely meaningless, since most of the gum found by it is produced by a catalytic action of the copper and was not present in the original sample.



Dr. O. C. Bridgeman

General Session—



Dr. Miller McClintock

The speaker at this meeting said that most states of the Union had erred in attempting to specify mechanical equipment for safety

STATE commissioners of motor vehicles could render a fine service to safety if they could assemble accident data which would show where mechanical failures generally occur, according to J. H. Hunt, past president of the Society of Automotive Engineers. Commenting on an able presenta-

tion of the Safety Aspects of Car Construction by Robbins B. Stoeckel, commissioner of motor vehicles, Connecticut, Friday afternoon, he pointed out that automotive engineers and the commonwealths have a common problem in safety, but facts on accidents have not been available from most of the states.

In his address Mr. Stoeckel dealt a blow to the theory that old cars created a larger safety hazard than new cars. Figures compiled by his department, he said, proved that upon inspection comparatively new cars more frequently needed service operations from a safety point of view than did comparatively old vehicles.

"A man will drive his new car with a feeling of safety—feeling sure that he needs no brake adjusting, for instance—whereas a driver of an old car will generally keep its mechanical equipment in fairly good condition," he said. Inspectors throughout the state gathered information supporting his contention.

Most states of the Union, he said, had erred in attempting to specify mechanical equipment for safety, rather than set up laws to cover safety in principle. No Legislature should attempt to specify the mechanical equipment of a vehicle because of the engineering knowledge which is required if these laws are to serve the purposes for which they were intended.

"The simple rule—'adequacy'—and a few simple tests to prove adequacy of brakes, for instance, should suffice. Adequacy can be tested readily by the state.

"Instead, many states have a more or less detailed explanation of a braking system for motor vehicles. But the manufacturer has gone on with his work blithely and built brakes along the lines recommended by his engineers as best practice, law or no law.

"Consequently, assuming that the engineers know their business, and in the absence of any statistics

whatever which prove that brakes on a common hookup are unsafe, each state which has this law has been required to face a dilemma: either to stick to strict interpretation and rule the offending cars off the road or to stretch the interpretation to mean 'separate means of brake application,' and forget the shaft hookup.

"The latter course has been followed. There are now in all such states having this law makes of cars which do not comply with it and which ought, in strict conformity with the letter thereof, to be ruled out. Among the guilty are some of the best known and highly thought of automobiles. How absurd! This law will necessarily be changed and a provision substituted which is not restrictive, so that the maker, as his engineers devise new and better methods, will not be compelled to violate it again. So eventually this difficulty will be disposed of."

Discussing the value of statistics in determining the reasons for accidents, Mr. Stoeckel pointed out that preliminary compilations of his department show that fires are not caused by mechanical defects or defective wiring, but generally follow a collision, when unpreventable conditions such as breaking of the ignition lines and spilling of gasoline occur.

"In making this study of fires and car wiring in order to find its relation thereto, it was discovered that there are quite a number of makes of cars in which the wiring is not armored. Insofar as these few cases examined go, it appears demonstrated that fires occur more often in cars where the wiring is not armored than in those where it is.

"It would seem as though there might be some invention produced which would shut off ignition when a collision happens. Such may possibly come along in the



Robbins B. Stoeckel

course of time, but until it does, the buyer of a car should be informed on obtainable results as to the statistics of cars which burn, so that he will have an opportunity to make his own investigation and to buy with his eyes open to the dangers which loose and defective wiring may possibly produce.

"Wiring which is not armored and which is not protected in any way, but simply hangs loose and depends upon insulation alone to prevent a possible spark or short circuit, ought perhaps to be looked into from the standpoint of insurance as well.

"Free-wheeling," he said, "has been taken by state motor vehicle commissioners as a step toward the elimination of the gearbox from automobiles. There is a question in connection with education which states will have to decide very shortly. That is, whether in view of the fact that here is a car with a new attribute about to appear on the highways, the state ought not to require examination in the operation of the new application; whether a state which is about to register a car which has a free-wheeling device ought not to require of its intended operators enough of an examination to prove knowledge of the capabilities of the device.

"The state must know that the operator will be able to use the innovation in its proper and intended manner, and that he has had enough experience with it and been taught enough about it so that he is safe to go upon the highways with it."

Detonation Symposium

(Continued from page 164)

for making up secondary standards. The humidity effect, while slight, is considered by the committee to be of sufficient importance to be given consideration.

The other paper, by Stacey, dealt with the oil consumption of the test engine. Lubricating oil is apparently harmful in its effect. If oil is dissolved in the gasoline, the knock rating of the fuel will usually be lowered. Consequently, if an excessive amount of oil should reach the combustion chamber, it is conceivable that the usefulness of the engine for knock rating would be impaired.

Work is still being done on other methods for measuring knock than by the bouncing pin. In air-cooled aircraft engines, it has been found, the temperature of the cylinder head varies considerably with the fuel used, and this temperature variation apparently follows the knock rating. Inserting a thermo couple in the spark plug gasket has been found to give some very interesting information. Rating by simply listening to the knock and evaluating by the human ear has been carried to quite a high degree of accuracy by some operators. While it is unquestionably not suitable as a general method, it has brought up the possibility of using sound as the indicator. The sound of knock can be amplified electrically and can be compared with artificially produced sound of standard intensity through the same amplification system. This phase of the subject was quite thoroughly covered by H. F. Huf, J. R. Sabina and J. B. Hill, and also by Neil MacCough.

The enormous amount of data in the eleven papers presented is evidence of the extreme care with which the Committee is proceeding. The necessity for studying so many phases of the subject with thoroughness and accuracy explains why very considerable time is necessary in developing a standardized

procedure for knock testing. It is the desire of the Committee to keep the procedure as simple as possible but at the same time not to leave out any factor the neglect of which might lead to serious differences in the results obtained.

General Development Session

(Continued from page 169)

casting properties are fully equal to those of the 4-3-0.1 alloy, it is too early to predict what its commercial status will be. In fact, Zamak No. 2, the 4-3-0.1 (or 4-3-0.05) alloy made with high-purity zinc, that is, with Horse Head Special, gives such good performance in service that I have never heard of any complaints from cases where the pure unadulterated alloy was employed properly.

Summarizing, Mr. Curtis said: "Metallic zinc is used in the automotive industry for electro-galvanizing; as a constituent of brass; as rolled sheet and strip for a variety of fabricated parts of which running-board molding heads the list, and in the production of a great number of die-cast parts. The marked improvement in both rolled zinc alloys and zinc die-casting alloys has done much to stimulate added interest in this white, non-ferrous metal, the price and properties of which lend themselves well to effect economy without jeopardizing quality.

"Not only have improvements been made in the physical properties of the various zinc alloys, but the application of attractive and durable plated finishes can now be accomplished without difficulty.

"The number of parts on the automobile which are made of zinc or zinc alloys is increasing annually. Additional investigations are being undertaken to produce still other zinc alloys with suitable properties for use in a wider range of automotive parts."

Rubber As Bearing Material

RUBBER is now being used as bearing material for centrifugal pumps and turbines having to deal with gritty water, according to *Engineering* of London. The rubber used for this purpose is of about the same resilience as the tread rubber of automobile tires, and varies in thickness from $\frac{1}{4}$ to $\frac{3}{8}$ in. The bearings themselves are usually made of plain cylindrical form and are vulcanized into a brass shell. Along the bearing surface is turned a helical groove which serves two purposes—for lubrication and as a channel through which any grit entering may be washed away.

Wet rubber has a very low coefficient of friction. The idea may be applicable to automobile water pumps.

Temperature of Minus 80 Degrees

A COOLING-COIL temperature of minus 80 deg. Fahr. and an air pressure of only about one-third that at sea level were attained recently during a test in the altitude laboratory of the Bureau of Standards. The air was cooled down to minus 53 deg. Fahr., which is said to be the lowest yet obtained in a test of this kind, and in order to obtain this temperature the cooling coils had to be brought down to nearly minus 80 deg.

Oxwelding in Plant Maintenance

IN large industrial plants a central welding department is becoming more and more a recognized division of the maintenance department, according to *Oxy-Acetylene Tips*, Dec., 1930. The central welding department is able to fabricate a great many special parts which are needed in the plant operations, thereby saving time and money.

In many automotive production plants, oxwelding is employed for plant maintenance and machine repair as well as in production work. One of the most frequent repairs made in automobile plants is that of fractured presses. A great many presses are employed in automobile production and they are occasionally subjected to overloads which result in fracture. Immediate repairs are necessary in order to prevent interruption to the production program at the plant. Bronze-welding by the oxy-acetylene process has become a standard procedure for effecting these repairs because of the speed and economy possible when using this method and also because the repair is a permanent one. The fact that only local preheating is needed to make a bronze-weld makes it possible to restore even the largest presses to service without dismantling. An interesting example of this occurred not long ago when a 20-ton toggle press used for stamping out rear fenders fractured close to a main bearing so that production was held up until a repair could be made. The bearing pedestal was bronze-welded in place, effecting a remarkable saving, as the only alternative would have necessitated tearing down the entire press in order to replace the casting containing the broken member at considerable expense.

Tests Cost of Welding Pipe

In connection with the use of welding in piping work in automobile plants, the power division of a large automobile company made some complete tests to determine the cost of welded piping as compared with screw-coupled lines. These tests were conducted on pipe of diameters ranging from 1/2-in. up to standard 24-in. pipe which was used in the exhaust lines. Even in the small sizes of pipe the results were decidedly in favor of welded construction. The tests were witnessed by plant officials and the division superintendent, and were the determining factors in the adoption of oxwelding for all future plant piping work. The plant officials were particularly impressed with the fact that even on small diameter pipe oxwelding is the most economical method.

As a result of the increased amount of welded piping in the factory the piping maintenance cost has been materially lowered. This was particularly true of the large sizes of pipe located in tunnels. Even on 1-in. pipe, however, the superintendent said that the increased tightness on high pressure steam lines was very noticeable.

The bronze-welding of broken foundry flasks is one of the largest maintenance welding applications in foundries. Flasks are subjected to particularly rough usage and are very frequently cracked. This application of bronze-welding has resulted in especially large savings in the reclamation of cast-iron pipe flasks. After each casting is taken out, the mold is cleaned by dropping it several feet to the ground, so that the

development of cracks occurs more frequently than in any other type of foundry flask. It is also exceedingly profitable to maintain flasks for small intricate castings by bronze-welding the small ribs when they break. Sometimes large pieces are broken out of flasks and have to be replaced. A piece of steel plate is then cut to fit the size of the hole and is bronze-welded in position.

Engine Session

(Continued from page 162)

and slightly higher. From experimental results and computations the authors arrived at the conclusion that a friction damper should be adjusted somewhat tighter than theoretically necessary, since insufficient tightening impairs its damping action much more than a corresponding excessive tightening.

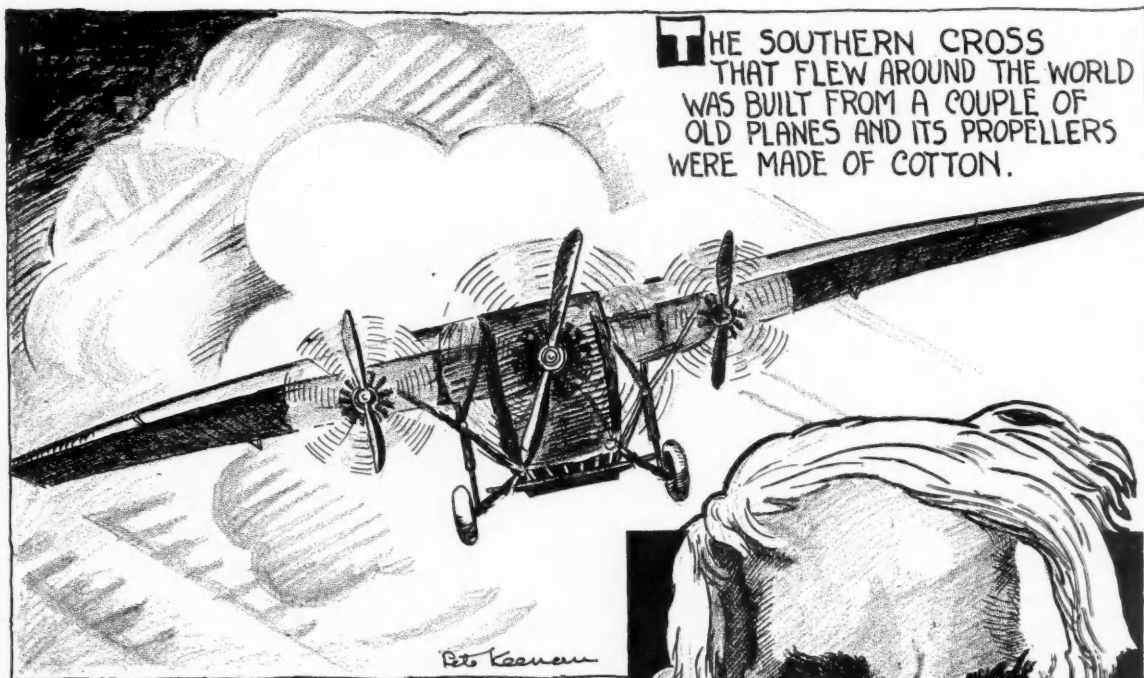
Mr. Van Degrift claimed that the damped dynamic type gave better performance, in that it provided lower shaft amplitudes for the same size damper and uses less damping. He also pointed out that while the increase in the number of cylinders and the decrease in inertia and in the exciting forces might make the damper less necessary from a stress standpoint, the increasing standard of smoothness and quiet operation would probably still require its use.

Mr. Lee disagreed with the authors of the paper in their statement regarding the ineffectiveness of simple dynamic balancers. He stated that in one particular engine out of some 50 installations on which he had worked, there were 14 distinct periods within the driving range, all of which were completely eliminated by the dynamic damper. By means of an apparatus permitting of varying the moment of inertia and the rate of the springs, Mr. Lee stated, it was found that the best results were obtained when the frequency of the dynamic damper was two-thirds that of the crankshaft assembly and the moment of inertia one-sixth to one-quarter of the effective moment of inertia of the crank system. Higher moments of inertia introduced two sets of periods which it was impossible to completely eliminate. He felt that possibly the authors had neglected to take account of the relation between damper frequency and moment of inertia.

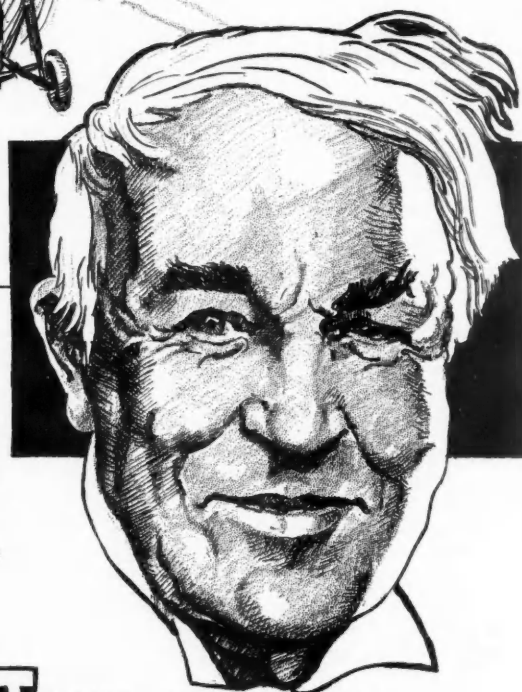
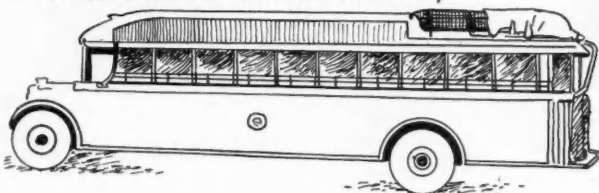
Mr. Lee added that he had found it desirable to use a build-up rate in the flexible member which does not follow a straight-line curve, as with a straight-line relation at speeds corresponding to the higher harmonics (low speeds) the damper will be so rigid that its moment of inertia will add directly to that of the crankshaft assembly. The same results, of course, are obtained in a friction damper by the use of a centrifugal force to vary the friction plate pressure.

THE German aluminum industry has launched a co-operative campaign to promote the increased use of aluminum in the production of vehicles of all kinds, as well as in other industries. A permanent exhibition has been opened in Berlin at which are depicted the methods of production, forms of application and possibilities of aluminum and its various alloys.

Automotive Oddities—By Pete Keenan

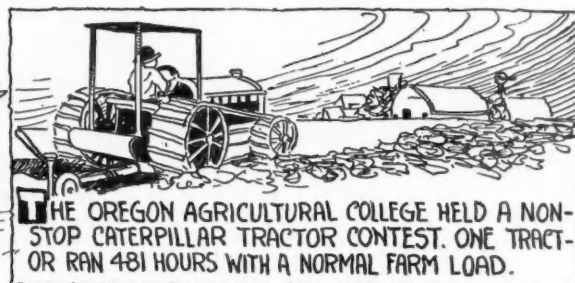


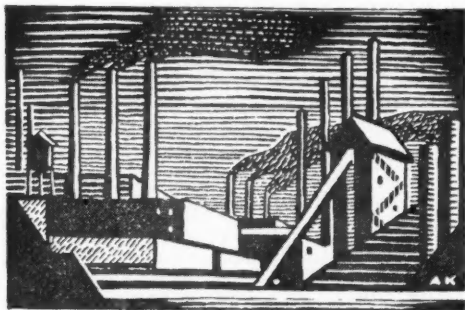
A CAR THIEF DOING BUSINESS IN A BIG WAY STOLE A GREYHOUND LINE BUS AND GOT AWAY WITH IT. Jan. 1931. New York City.



THOMAS ALVA EDISON DEvised AN AUTOMOTIVE ENGINE POWERED BY NITROGLYCERINE IN 1880.

THE FIRST KNOX, SOLD IN 1900 TO A PHYSICIAN.





NEWS OF THE INDUSTRY

Another Midget Shown at Chicago

**Thompson Littlemac
Powered With Former
Durant Star Engine**

CHICAGO, Jan. 28—The first public exhibition of the Littlemac, last mentioned in the May 17, 1930, issue of *Automotive Industries*, was given at the Chicago Automobile Show. The company offering this small, 82-in. wheelbase, 42-in. tread car is the Thompson Motor Corp. of Muscatine, Iowa.

Its president is H. G. Thompson of Muscatine. Samuel Block is first vice-president; J. J. Valentine, second vice-president; Ralph V. Thompson, secretary; H. H. Hogan, treasurer; R. D. Rasmussen, formerly with Auburn, is sales manager. A. J. Metz, formerly with Duesenberg and International Harvester, is production engineer, and Leonard Bowen, formerly with the Berry Pulley Co., is chief engineer.

Officials of the factory state that production is expected to get under way on a small scale around Feb. 15. A new plant is being built in Muscatine, however, it is stated, with a capacity of 100 cars per day.

Specifications given out for the Littlemac, show that it carries the former Star Four Continental engine of 3½ by 4¼ in. It has a Borg & Beck 9A clutch, Warner Gear three-speed transmission, Timken rear axle with three to one reduction, tubular front axles with welded yokes, double quarter-elliptic springs in front, and single quarter-elliptics in the rear. Wheels are artillery type with 26/4.00 tires. Bendix brakes, operating on the rear wheels only, are used for service with an emergency brake on the propeller shaft. There is a 10-gal. gas tank under the cowl for gravity feed. Electrical units are Auto-Lite.

It is stated that two models will be produced, a two-passenger coupe listing at \$438, and a delivery model.

Seek Automatic Plane Control

NEW YORK, Jan. 28—Complete automatic control of airplanes while in the air is being sought through the joint activities of General Electric Co., Sperry Gyroscope Co. and the United States War Department.

The News Trailer

By Herbert Hosking

CHICAGO, Jan. 27—Fifty policemen arrived at the Bendix Galleries in the former Potter Palmer mansion, 1350 Lake Shore Drive, last night to answer a burglar alarm. They were greeted at the door by Vincent Bendix, who invited them in for a "cup of coffee," explaining that the alarm was "only a mistake." Mr. Bendix was entertaining a number of visiting automobile magnates and one of these gave away the secret, which was that a New York automobile man expressed doubt that Chicago had a police department; whereupon the alarm was sounded and the officers appeared almost immediately.

BUFFALO, Jan. 28—Everett Van Nostrand, of Wellsville, N. Y., celebrated his 91st birthday recently. Mr. Van Nostrand claims some distinction in the automotive industry as one of the few members of the great buying public who cut through official red tape and obtained one of the first Ford Model A cars at the time of their appearance, when demand far exceeded supply. Van Nostrand accomplished this feat by writing direct to Henry Ford, explaining that because of his advanced years he would like to get the car at once so as to get the maximum of mileage out of it. Ford headquarters wired the Buffalo office and within a short time a new Model A was delivered to Van Nostrand. He still drives it and is now planning to outlive it.

The Navy Department has purchased an Autogiro * * * R. W. Hardy, safety engineer of Olds, is new president of Lansing Industrial Safety Club * * * M. A. Clark of U. S. Rubber is assisting the U. of Detroit with advice * * * Barney Oldfield is itching for a wheel again * * * the Christmas greetings of the Royal East African Automobile and Aeronautic Association are here at last . . . now there is only Timbuktu to be heard from, and then we can get down to serious work * * * Chrysler recently shipped a boatload of cars to the Pacific Coast via S.S. Virginia . . . the motto for such shipments, of course, being "hold everything."

Marmon Clears Old Car Stocks

**Plans Production on
New Lines Within
Thirty Days**

INDIANAPOLIS, Jan. 28—With the clearing of stocks of Marmon cars of the 1930 series, G. M. Williams, president of the Marmon Motor Car Co., announced today that production on the two new eights and the new sixteen will start within 30 days.

Mr. Williams said that the merchandising loss in clearing the old stocks had been taken care of by the finances of the company and that bank loans had been negotiated under agreeable terms for the production of the three new cars. Approximately \$1,000,000 will be involved in bringing out the new line and clearing the old stocks and only a part of this has been borrowed by the Marmon Company, Mr. Williams asserted. Mr. Williams intimated that a large part of the loss suffered by the Marmon Company could have been dodged had the company wished to abandon its trade outlets in the depression. Under a plan adopted almost six months ago the Marmon Company has been lending considerable aid to its dealers to keep the sales organization as nearly intact as possible. This program has shifted some of the distributors' and dealers' financial burden on the factory.

S.A.E. Elects L. C. Hill

NEW YORK, Jan. 27—L. Clayton Hill, president and general manager of Dietrich, Inc., has been elected a councilor of the Society of Automotive Engineers to fill the unexpired term of F. K. Glynn of the American Telephone and Telegraph Co., who has been elected a vice-president. Mr. Hill will be on the council until the end of the present administrative year, following the next annual meeting of the Society.

Ethyl Sales Set Record

NEW YORK, Jan. 28—Nineteen thirty was a record year for the Ethyl Gasoline Corp. Sales aggregated nearly 2,000,000,000 gal., a gain of 48 per cent over 1929, it has been announced by the corporation.

Men of the Industry and What They Are Doing

Marmon Promotes Noland

The appointment of P. H. Noland as general manager of the Marmon Motor Car Co., effective immediately, has been announced by G. M. Williams, Marmon president. Mr. Noland also has been elected to the company's directorate.

Becoming associated with Marmon in June of last year, Mr. Noland has held the position of assistant general manager. In his new capacity he succeeds H. L. Purdy, who resigned during the past year, and he will have general supervision over manufacturing, engineering, sales, service, purchasing and other important departments of the business.



P. H. Noland

Pierce Names Engstrom

The appointment of A. A. Engstrom as general sales manager of the Pierce-Arrow Motor Car Co. has just been announced by George E. Willis, Pierce-Arrow vice-president in charge



A. A. Engstrom

of sales. D. J. Willoughby, whom Mr. Engstrom succeeds, has been named vice-president and general manager of the Pierce-Arrow Sales Corp. factory distributing and retail branch in New York.

Mr. Engstrom's association with the automotive industry dates back to 1905, when he was engaged as auditor of the Buick Motor Co., during the early regime of W. C. Durant. He continued in this capacity until 1912, when he became identified with Continental Motors Corp., finally becoming general manager.

Mr. Willoughby has been with Pierce-Arrow the last two years as general sales manager.

Durant Names Two

George H. Moriarty, executive assistant to W. C. Durant, announces that Harry W. Trueblood has been named

as Pacific Northwest district manager for the company. Mr. Trueblood has been associated with Durant for the past 11 years, most of this time in the Oregon region. P. H. Dunn of Portland, has been named manager of the Northern California district for Durant with headquarters at San Francisco.

Coda Succeeds Dowell

Arthur P. Dowell, vice-president and director of manufacturing of the Murray Corp. of America, has resigned. C. F. Coda will succeed Mr. Dowell as vice-president and director of manufacturing.

Goodrich Names Huntington

M. G. Huntington, formerly of the sales promotion staff of the B. F. Goodrich Rubber Co., has been made sales promotion and advertising manager of the Diamond and Brunswick divisions of Goodrich, it has been announced by P. J. Kelly, Goodrich advertising manager.

Mr. Huntington succeeds W. P. Marquam, who has resigned to become associated with Henri, Hurst & McDonald Advertising Agency in Chicago, Ill.

Geschelin to Read Paper

A paper entitled "Recent Development in Works Management in the Automotive Field" will be read by Joseph Geschelin, engineering editor, *Automotive Industries*, before the Pennsylvania Section of the Society of Industrial Engineers on Feb. 4. This paper will deal with high spots such as budgeting, scheduling and wage incentives.

L. A. Graham Joins Agency

L. A. Graham, formerly vice-president in charge of sales for the Relay Motors Corp., Lima, Ohio, has become associated as vice-president with Freeze-Vogel-Crawford, Inc., Milwaukee advertising agency.

Monroe Succeeds Fend

V. W. Monroe has been appointed manager of the export department of the Willard Storage Battery Co., Cleveland, succeeding E. W. Fend, who has resigned.

Seiberling Visits St. Louis

Conditions in the tire business are gradually getting better, according to Frank A. Seiberling, president of the Seiberling Rubber Co., who was in St. Louis last week to attend a dealers' meeting.

Durant Names Jack

Robert K. Jack, former chief engineer of the Olds Motor Works, has been named chief engineer of the Durant Motors, Inc., according to announcement of H. W. Alger, general manager. J. F. Howard, who has been with Durant for six years as body engineer, will be assistant to Mr. Jack.

Mr. Jack started his engineering career with Argyll Motors, Ltd., Glasgow, Scotland, in 1902. He came to the United States in 1911. He returned to Scotland as works manager for the Arrol Johnson company in 1916 and during the war had charge of important war work. After the armistice he

returned to America, where he accepted a position with the Olds Motor Works at Lansing. He was promoted to the position of chief engineer in July, 1919, and served in that capacity for 7½ years. Mr. Jack was one of the engineers who planned the General Motors Proving Grounds and for years was a member of the General Motors technical committee.

Howard Assumes Duties

Graeme K. Howard, vice-president and general manager of the General Motors Export Division, recently returned from Australia to assume his duties, as of Jan. 1. At the time of his appointment as general manager (September, 1930), was actively engaged in field work in the island continent.



Graeme K. Howard

Firestone Addresses Kiwanians

Harvey S. Firestone told the Jacksonville Kiwanis Club here Wednesday, Jan. 21, that the business depression has reached its bottom.

"This is the turning point," he said. "The way inclines up, not so fast as it came down, still definitely upward."

Mr. Firestone said his impression of business over the country was it was steadily growing better.

Exports, Imports and Reimports of the Automotive Industry for December and for 12 Months Ended December, 1930-1929

	Month of December		Twelve Months Ended December		Twelve Months Ended December	
	1930	1929	1930	1929	1930	1929
	Number	Value	Number	Value	Number	Value
Automobiles, parts and accessories .....	..	\$15,292,403	..	\$25,676,563	..	\$277,427,052
Electric trucks and passenger cars	1	875	22	21,614	..	62,066
Motor trucks and buses except electric (total)	5,102	3,369,406	10,908	6,358,236	84,513	55,856,160
Up to one ton (inclusive)	2,779	1,111,498	8,399	3,543,784	35,375	17,845,474
Over 1 and up to 2½ tons	1,986	1,460,373	2,339	2,321,055	44,880	29,116,596
Over 2½ tons	337	797,535	170	493,397	4,258	8,894,090
PASSENGER CARS						
Passenger cars except electric (total)	9,096	5,472,154	13,831	10,305,108	153,069	105,979,545
Low price range \$1,000 inclusive	7,123	3,151,602	8,924	4,432,359	111,455	55,545,265
Medium price range \$1,000 up to \$2,000	1,619	1,695,228	4,368	4,647,651	36,292	37,733,362
High price range over \$2,000	264	625,324	539	1,225,098	5,322	12,700,918
PARTS, ETC.						
Parts, except engines and tires .....	..	..	..	..	..	..
Automobile unit assemblies .....	..	3,247,638	..	4,389,564	..	61,259,726
Automobile parts for replacements (n.e.s.) .....	..	2,722,543	..	3,841,337	..	42,330,187
Automobile accessories .....	..	329,768	..	582,702	..	5,542,867
Automobile service appliances (n.e.s.) .....	..	285,025	..	496,705	..	5,879,739
Trailers	32	46,704	..	17,830	1,322	648,359
Airplanes, seaplanes and other aircraft	23	261,865	23	443,146	321	4,819,669
Parts and accessories, except tires .....	..	177,518	..	244,086	..	2,351,651
BICYCLES, ETC.						
Bicycles	225	5,066	372	9,840	3,746	98,538
Motorcycles	230	56,644	982	241,834	10,262	2,410,412
Parts and accessories, except tires .....	..	50,247	..	89,390	..	955,155
INTERNAL COMBUSTION ENGINES						
Stationary and Portable						
Diesel and Semi-Diesel	11	67,953	154	161,894	301	991,648
Other stationary and portable:						
Not over 10 hp.	715	68,662	2,280	167,212	24,209	1,833,598
Over 10 hp.	66	59,039	233	140,800	4,105	2,302,481
Automobile engines for:						
Motor trucks and buses	95	23,750	213	26,281	19,489	1,635,047
Passenger cars	1,026	85,661	1,370	151,721	41,106	3,990,870
Tractors	30	16,844	37	12,640	279	122,155
Aircraft	7	11,337	19	66,050	376	1,634,885
Accessories and parts (carburetors) .....	..	174,088	..	275,504	..	3,329,330
IMPORTS						
Automobiles and chassis (dutiable)	67	52,075	48	51,113	709	875,146
Other vehicles and parts for them (dutiable) .....	..	2,410	..	42,256	..	353,585
REIMPORTS						
Automobiles (free from duty)	21	17,080	25	41,299	332	322,740

Atterbury Has New Models

BUFFALO, Jan. 26—Atterbury Motor Car Co. used the recent Buffalo show to introduce its new and improved line of sixes. The line, comprising six models ranging from two to five tons capacity, possesses attractive appearance created by long hood and cowl design, use of bright-wear on radiator shell and headlights and coupe-type cab. Ready accessibility to major units for maintenance was one of the principal considerations borne in mind by the engineers.

Six-cylinder engines, multi-speed transmissions, four-wheel hydraulic brakes and worm and bevel drive rear axles are embodied in all models and reflect briefly the modern trend followed by the Atterbury engineers when designing the line. The line consists of a 2-tonner, designated as Model 45; 2½-ton Model 50; two 3-tonners, Models 60 and 65; 3½-ton Model 70 and 5-ton Model 100.

McClaren Rubber Elects

CHARLOTTE, N. C., Jan. 26—Reorganization of the McClaren Rubber Co. has been completed, it is announced. I. Eisbrouch, formerly of Racine, Wis., was named vice-president and treasurer.

Other officers elected were: P. J. Mayle, secretary; H. McA. Rose of Charlotte, assistant secretary. Election of a president was postponed indefinitely.

The following constitute the board of directors: I. Eisbrouch, Lee A. Folger, Norman Cocke, C. A. Cochran, all

of Charlotte; W. T. Smith, New York; J. L. McNair, Laurinburg, N. C., and H. H. Wolf of Chicago.

Plans Plant Expansion

SOUTH MILWAUKEE, WIS., Jan. 26—The I. J. D. Metal Products Co., Thirteenth and Minnesota Avenues, established Oct. 1, to manufacture a line of automotive and other specialized stampings, is about to start work on a factory addition, 60 x 80 ft., two-story, to be equipped with five presses, the largest capable of producing automobile fenders. Its line will also be extended to include gasoline tanks and other similar units and parts. Until now the monthly consumption of steel sheets has been upward of 40 tons. Ignatius and Joseph Wnuk and N. C. Dudley are the principals in the company.

Milwaukee Plant Steps Up

MILWAUKEE, Jan. 26—The Milwaukee Ford assembly plant's schedule for February calls for 100 cars per working day instead of 90 in January, according to L. T. Henderson, general manager. The plant is the source of supply for Wisconsin and upper Michigan dealers.

American Forging Declares

PONTIAC, MICH., Jan. 26—American Forging & Socket Co. directors have declared the regular quarterly dividend of 15 cents per share, payable Feb. 1 to stockholders of record Jan. 25.

Plans Second Bearing Plant

WASHINGTON, Jan. 26—The erection of another ball-bearing factory in Moscow with the intention of tripling the present output during 1931 is under consideration by the Swedish Ball Bearing Co. which now operates a factory in that city, according to Edward Savage, Charge d'Affaires, Stockholm, made public by the Department of Commerce.

Based on an article in the *Stockholm Tidningen*, the report states that the present factory has increased its production from 50,000 to 1,000,000 bearings and the new factory will be erected to further increase this output.

At present the concession occupies more than 1000 workers and employees, the report states, and covers a period of 40 years, after which time the plant will automatically pass into the possession of the Russian State.

Illinois Revenue Sets Record

SPRINGFIELD, ILL., Jan. 26—Since enactment of the motor vehicle tax law in 1911, Illinois has collected \$146,027,102 from this source, Secretary of State William J. Stratton announced last week. Last year the revenue was \$18,447,246, a peak figure, bringing the two-year total to \$35,534,445, more than a quarter of the total collections for 20 years. The revenue from this source provided funds for pavement of nearly 5000 miles of Illinois highways. Last year the passenger car licenses totaled 1,429,146; trucks 209,115, compared to 64,997 in 1920.

Dodge Adds More Workers

Steady Increase
Hailed by Keller

DETROIT, Jan. 28—There has been a steady increase in employment at Dodge Bros. for almost 60 days, 1600 men being added since Christmas, making a total force of 10,231.

K. T. Keller comments in part, "Although our factories are not working at full time capacity and I do not wish to convey that impression, the very fact that each week for almost two months we have been able to add to our payroll, makes me feel that now, at last, we may be on our way to that long heralded return of prosperity." Retail delivery of Dodge sixes and eights during December showed an increase of 29.6 per cent over November and total shipments from the factory showed increase of 129.2 per cent over November.

Retail sales figures for week of Jan. 3, A. Van Der Zee stated, show an increase of 16.4 per cent over the last week in December; week of Jan. 10, 21.9 per cent over week of Jan. 3 and week of Jan. 17, 7.8 per cent over previous week. More than 2000 people visited Dodge's new permanent transportation and equipment exhibit.

Many N. C. Vehicles Remain Unregistered

RALEIGH, N. C., Jan. 26—With the first month of 1931 far advanced, approximately 75,000 motor vehicles of North Carolina have been stored by their owners because of inability to pay the annual tag tax, according to semi-official estimates obtained at the state capitol. The organized automotive trade and the State Highway Commission are concerned over this situation because of the loss in business and in revenues from the gasoline tax.

Studebaker Cuts Dividend

CHICAGO, Jan. 28—Studebaker Corp. has declared a quarterly dividend of 30 cents a share on common and the regular quarterly dividend of \$1.75 on preferred, both payable March 2 to stock of record Feb. 10. This places the common on a \$1.20 annual basis, compared with \$3 a share previously paid.

Lycoming Board Confirms Beal

WILLIAMSPORT, PA., Jan. 28—At a meeting of the board of directors of the Lycoming Mfg. Co., E. L. Cord was reelected chairman of the board; W. H. Beal, president and general manager, and Frank Bender, vice-president and assistant general manager.

Diamond T Declares

NEW YORK, Jan. 28—Diamond T Motor Car Co. has declared quarterly dividend of \$1.75, payable Feb. 1.

Delage Making Aero Engine

PARIS, Jan. 16 (*by mail*)—Plans having been approved by the French Air Ministry, the Delage Automobile Co. of this city has gone into production of a first series of aviation engines, the design of which is based largely on experience gained in automobile racing. The engines are supercharged, have a nominal rating of 500 hp., are of the high speed type with geared down propeller, and of low specific weight.

Milwaukee Show is Successful

MILWAUKEE, Jan. 26—The 1931 Milwaukee show attracted a total attendance of 92,000, a gain of more than 15,000 over the 1930 show, figures issued by the Milwaukee Automotive Trades, Inc., reveal. In 1929 the official figure was 98,998; in 1928, 119,406, and in 1927, 123,938, which set an all-time record. Exhibitors say their show sales were considerably better than last year.

Globe to Open New Plant

DES MOINES, IOWA, Jan. 26—The Globe Machinery and Supply Co. will open a new auto hoist factory in Philadelphia March 15, it has been announced by Fred W. Swanson, president of the company. The Philadelphia plant will employ 60 men and output is intended for the Eastern and export trade requirements. The plant will have a larger capacity than the Des Moines factory, he said, and will represent investment of about \$100,000. H. A. Bruner, production manager here, will be in charge. The company was established three years ago.

Oregon Revenue Reported

SALEM, ORE., Jan. 26—Motor vehicle registration fees for the first six months of the present fiscal year to Jan. 1 totaled \$6,192,386.58. Registrations include 233,787 automobiles and trucks under one-ton capacity, returning fees of \$935,847.29; 1397 motorcycles, 10,907 chauffeurs, 487 dealers and 17,738 operators were included in the revenue-producing classifications.

Dealers Elect F. J. Edwards

F. W. A. Vesper Reelected
Treasurer of N.A.D.A.

CHICAGO, Jan. 28—Frank J. Edwards, Dodge dealer, Milwaukee, was elected president of the National Automobile Dealers Association at the 14th annual convention of the association held here on Monday and Tuesday of this week. George D. Wray, Chrysler, Shreveport, La., was elected first vice-president, and Floris T. Nagelvoort, Cadillac, Seattle, second vice-president. F. W. A. Vesper, St. Louis, was reelected treasurer.

Resolutions were adopted indorsing the recent N.A.C.C. recommendations on uniform announcements of new models and dealers were urged to continue their support of this policy. The association also reaffirmed the platform of reform adopted at the 1930 convention.

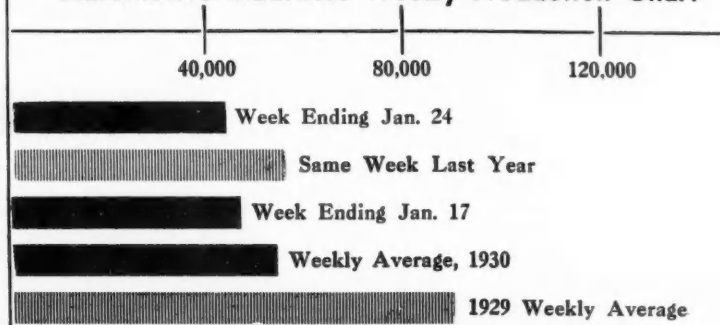
Mooney Sails for Europe

NEW YORK, Jan. 29—James D. Mooney, vice-president of General Motors Corp. in charge of export, sailed today on the S.S. Europa for a brief trip to Europe. Mr. Mooney plans to go first to Berlin, after which he will visit Russelsheim, London, Antwerp and Paris. He expects to return to New York on March 3. Also sailing on the Europa is Edward Winter, Berlin Cadillac dealer and one of General Motors largest European dealers. M. K. Clark, assistant managing director of General Motors Export Co., sailed yesterday on the United Fruit Line S.S. Metapen.

Stewart-Warner Reports

CHICAGO, Jan. 28—Stewart-Warner Corp., in a preliminary report for 1930, shows net earnings of \$1,262,278 after all charges. This is equivalent to 97 cents a share on outstanding stock and compares with \$6,838,938, or \$5.37 a share in 1929. Operations for the December quarter show a loss of \$721,171, as compared with a gain of \$412,657, or 32 cents a share, for the last quarter business in 1929. Directors omitted the dividend on common stock due at this time.

Automotive Industries Weekly Production Chart



Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

NEW YORK, Jan. 28—Business in wholesale and jobbing lines fell off last week, and the best showing was made in retail trade. Salesmen who travel throughout the country report that there is a noticeable disposition to buy in many of the larger cities.

U. S. EMPLOYMENT

Employment in the United States in December, according to the Department of Labor, decreased 1 per cent, while total wages in the 15 industrial groups under survey declined 0.4 per cent.

MERCHANDISE EXPORTS

Merchandise exports during December amounted to \$273,000,000, as against \$426,551,000 a year ago, while imports amounted to \$209,000,000, as against \$309,809,000. Exports during 1930 were the lowest since 1922, and imports were the lowest since 1921.

CAR LOADINGS

Railway freight loadings during the week ended Jan. 10 totaled 714,251 cars, which marks an increase of 98,869 cars above those in the preceding week, but a decrease of 148,210 cars below those a year ago and a decrease of 200,187 cars below those two years ago.

COTTON SPINNING

Cotton spinning spindles in place on Dec. 31 numbered 33,567,102, of which 25,525,820 were operated at same time during the month, as against 25,858,016 during the preceding month and 29,047,039 a year ago.

CRUDE OIL OUTPUT

Average daily crude oil production for the week ended Jan. 17 amounted to 2,094,000 bbl., as against 2,084,900 bbl. for the preceding week and 2,661,650 bbl. a year ago.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended Jan. 24 stood at 77.6, as against 77.9 the week before and 78.3 two weeks before.

BANK DEBITS

Bank debits to individual accounts outside of New York City during the week ended Jan. 21 were 20 per cent below those in the corresponding period last year.

STOCK MARKET

The stock market last week was irregular and dull until last Friday when the volume of trading increased and prices all around advanced. Most issues registered net gains for the week, and the general price level reached the highest for this year.

BROKERS' LOANS

Brokers' loans in New York City during the week ended Jan. 21 decreased \$63,000,000, bringing the total down to \$1,757,000,000, as against \$6,804,000,000 in October, 1929.

FEDERAL RESERVE STATEMENT

The consolidated statement of the Federal Reserve banks for the week ended Jan. 21 showed decreases of \$13,000,000 in holdings of discounted bills, of \$44,000,000 in holdings of bills purchased in the open market, and of \$19,000,000 in holdings of Government securities. The reserve ratio on Jan. 21 was 82.1, as against 79.3 a week earlier and 76.3 two weeks earlier.

Packard May Earn \$9,000,000

DETROIT, Jan. 26—Preliminary figures for 1930 indicate that Packard Motor Car Co. will earn at least \$9,000,000, according to Alvan Macauley, president.

Soviet Increases Tractor Output

NEW YORK, Jan. 26—The Soviet tractor plants in the U.S.S.R. have planned a production of tractor parts for the year 1931 of five times that turned out during 1930. The projected output will have a value of 90 million rubles. The leading factory for the production of these parts, especially of the Fordson type, will be the Red Putilov plant in Leningrad.

Develops New Tool Steel

DETROIT, Jan. 26—After a long period of research, the Detroit Alloy Steel Co. announces Carbomang, an oil-hardening tool steel cast to shape. The field for this steel is in the making of high-grade tool steel forms for purposes where higher-priced alloy steel castings are not economical. Carbomang castings are said to be free from strains and are readily machinable. The material can be cast in intricate patterns and is thus suitable for a variety of types of die work.

Maryland Inspections Tabulated

BALTIMORE, MD., Jan. 26—Figures just compiled by the office of the Maryland Motor Vehicle Commissioner, Baltimore, show that 97.8 per cent of the motor vehicles registered in the state were inspected in the Save-A-Life campaign conducted throughout November. The inspections were made by about 1500 authorized stations throughout the state. Inspection was required in order to get licenses for 1931.

A total of 331,648 motor vehicles were registered in the state and 324,280 underwent inspection. Of this number, 407 could not pass the test and were rejected.

The inspections showed that faulty headlights was the most common trouble and brakes came next on the list. Adjustment of headlights was necessary in 44,733 cases and in 19,153 cases lights had to be replaced. Brakes required adjustment in 33,804 cases and in 16,317 instances they required relining.

Builds Largest Grinder

WORCESTER, MASS., Jan. 26—What is believed to be the largest grinding machine with a traversing table in the world has just been completed by the Norton Co. It will grind work up to 36 in. in diameter, 288 in. in length with a limit of allowable weight of 40,000 lb. The machine was built for the Southwark Foundry & Machine Co., Philadelphia.

Attend Baltimore Show

BALTIMORE, Jan. 26—The members of the Baltimore Section, Society of Automotive Engineers, attended the twenty-fifth annual automobile show in Baltimore on Jan. 21. They went to the show in a body following their monthly meeting and banquet.

December U.S. Output Set at 155,601 Units

Year's Total Reached 3,354,870 Vehicles

WASHINGTON, Jan. 29—Making an increase of 19,849 units, the production of motor vehicles in the United States last December was 155,601, as against 135,752 in November, according to the Bureau of the Census. The passenger car output increased 20,277 in December to 122,645 from 102,358 in November, while the motor truck output declined 1254 to 31,531 from 32,785. The production of taxicabs in December was 1425, as against 609 in November.

For the year 1930, the production of motor vehicles in the United States totaled 3,354,870, a drop of 2,003,550 from the 1929 output of 5,358,420. The 1930 production of passenger cars was 2,805,413, a decrease of 1,764,398 under the 1929 production of 4,569,811. Motor trucks to the number of 540,521 were manufactured in 1930, a drop of 230,499 under the 1929 output of 771,020. The taxicab production last year was 8936, as against 17,598 in the previous year.

The Canadian production of motor vehicles last year was 154,192, a decrease of 109,103 under the output of 263,295 in 1929. Of the 1930 Canadian production, 125,442 units were passenger cars, representing a decline of 82,056 under the 1929 production of 207,498. The truck production in Canada last year was 28,750, a drop of 37,047 under the output of 55,797 in 1929.

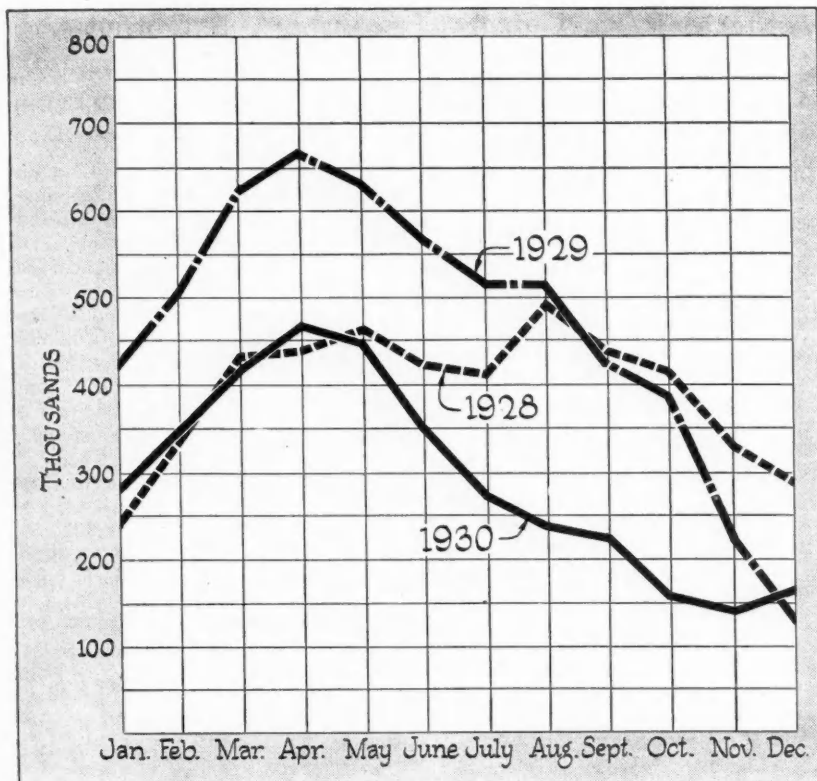
Seeks Truck Regulation

AUSTIN, TEX., Jan. 27—At the direction of the legislative committee of the Texas branch of the American Automobile Association, a bill has been drawn for introduction in the legislature to provide for the regulation of motor truck traffic upon highways of the state.

The bill provides that all truck operators shall carry \$2,000 insurance for property damage; personal liability insurance of \$10,000 for one person and \$25,000 for two or more persons. The entire length of truck and trailer or semi-trailer shall be not more than 65 ft., width not more than 96 in. and height not more than 12 ft. The use of solid tires would be eliminated and the maximum speed set at 25 m.p.h.

Soviet Imports More U. S. Tractors

NEW YORK, Jan. 26—Exports of wheel tractors to the U.S.S.R. from the United States during the first 10 months of 1930 totaled \$17,398,873, an increase of 150 per cent over the previous year. American aircraft engines exported during the period totaled \$128,372, or more than six times the value of the Soviet imports for the previous year.



Perversity of a Seasonal Trend

With the December, 1930, production of motor vehicles in the United States and Canada announced by the Bureau of the Census, the monthly trend chart as shown above is complete, and the reversal in December, 1930, of the usual seasonal trend is graphically illustrated.

Cites Possibilities of African Markets

WASHINGTON, Jan. 27—While Africa now possesses only approximately 1.25 per cent of the total number of trucks and buses now registered throughout the world, its progress in motorization during the past decade has been steady and consistent; and its future growth in these forms of transportation is expected to continue as consistently as in the past, according to the automotive division, Department of Commerce.

Roads in general are inadequate in number and in quality and are a rather serious drawback to any great rapid expansion in the use of truck and bus transportation; moreover, the general buying power of most of the countries is relatively small. On the other hand, railways are few in number, being impracticable in many sections of the country, so that the automobile will be utilized when new roads are opened and transportation routes established.

British to Build Huge Track

LONDON, Jan. 19 (by mail)—The approval of the government and the local authorities concerned has been secured for the project, first mooted some 18 months ago, whereby a 15-mile speedway should be constructed along the East Coast of England near the popular seaside resort, Skegness.

The promoting company (the Automobile Racing Association) states that work will be commenced at an early date, but that three years will be required to bring the project to completion.

Auburn Orders Set Record

AUBURN, IND., Jan. 27—All records have been broken for the first 25 days of January in the number of orders received for the new Auburn models, R. H. Faulkner, vice-president of the company, announced today.

Dealer orders are 85 per cent ahead of last year and 30 per cent ahead of 1929, the record year of the company and of the industry.

With more than 6000 orders on hand for delivery by March 1, the company, Faulkner said, is expending every effort to bring production up to meet these requirements.

Thermoid Acquires Company

TRENTON, N. J., Jan. 27—Thermoid Co. has assumed full control of the Woven Steel Hose & Rubber Co., Trenton, according to an announcement made by Robert J. Stokes, president of the former concern.

Ford Adds De Luxe Delivery

DETROIT, Jan. 27—A town car delivery body on the standard Model A chassis has just been announced by the Ford Motor Co.

Demand Improves For All Steel Lines

Business is More Evenly Distributed

NEW YORK, Jan. 29—Automotive demand for all descriptions of finished steel is well maintained. So far every week since the beginning of the year has shown moderate gains, but there is no indication of a shift to a quicker buying movement. In fact, market observers look for a continuance of slow gains next month rather than for a more spectacular spurt.

A more equitable distribution of business is noted. More sheet mills are operating at what is commonly referred to as about 50 per cent of capacity, but is actually in many cases a 100 per cent gain over last year's operating low point. All descriptions of finished steel share in the gain where a few weeks ago some were utterly neglected. Strip mills are doing better even though the operating rate for the industry as a whole is still relatively light. Cold-finished steel bars have also scored slight gains. Demand for automotive alloy steels is on the slow uptrend.

Buying of wire and wire products by automotive consumers has broadened. Betterment is also noted in the more even distribution of business among the different steel-producing districts. Prices are looked upon as thoroughly stabilized, and while reductions in the prices of some passenger motor cars tend to act as a brake on any upward tendency of automotive steel prices, prevailing levels are generally looked upon as satisfactory to buyers, although in some cases still unsatisfactory to producers.

Pig Iron—Automotive foundries are melting iron at a fair rate, but continue to refrain from covering more than their nearby needs. The market, both as to tone and prices, is unchanged.

Aluminum—Routine conditions prevail. Dominion statistics show that last year's exports from Canada to the United States were 11,821,800 lb., as compared with 28,362,100 lb. in 1929. Canadian aluminum exports to Japan rose from 17,570,600 lb. in 1929 to 19,517,300 lb. last year.

Copper—When export demand turned quiet, the market eased off here. The "official" price remained at 10 cents, but custom smelters offered metal at as low as 9½ cents, delivered Connecticut, and 9½ cents, delivered Middle West.

Tin—Consuming demand is light. Straits tin was quoted at 25¼ cents at the week's beginning.

Lead—Very quiet and unchanged.

Zinc—Somewhat lighter ore output.

Reynolds Reports Loss

DETROIT, Jan. 26—Reynolds Spring Co. and its subsidiaries has reported for the first nine months ended Sept. 30, 1930, net loss of \$330,188 after depreciation and interest, compared with a profit before Federal taxes of \$186,050 for the corresponding period in 1929. For the September quarter net loss was \$234,141 after above charges, as compared with net loss of \$80,029 in the preceding quarter, and profit before Federal taxes of \$58,399 in the September quarter of 1929.

Gramm Announces New Truck Model

"History Maker" Will Companion C-2 Line

DELPHOS, OHIO, Jan. 26—The Gramm "History Maker," just announced by Gramm Motors, Inc., is offered as a companion model to the series "C" 2-tonner. The new model is also a 2-tonner, but of series "CX," and carries a straight rating of 12,000 lb. It is furnished with a four or six-cylinder engine option in two wheelbases. Equipped with a four in the 131-in. wheelbase, the list is \$1,095 and with a six, \$1,295; in the 157-in. wheelbase the price is \$1,145 and \$1,345 for the four and six respectively.

Both the four and six have L-head Continental engines. The 4½ x 4¼-in. four displaces 227 cu. in. and develops 55 hp. at 2600 r.p.m., while the 3½ x 4½-in. six, displacing 248 cu. in., develops 70 hp. at 3000 r.p.m. The engine is mounted in unit with a Jones single-plate clutch and a four-speed Warner Gear transmission. Starting, lighting and ignition is furnished by Auto-Lite equipment and U. S. L. battery. The gasoline system consists of an 18-gal. tank with visible gage mounted on the side between running board and frame from which gasoline is fed by a mechanical pump to a Tilson carburetor.

Murray Gets Receiver

TRENTON, N. J., Jan. 27—Judge William N. Runyon has appointed Alfred H. Branham, vice-president and general manager of the Murray Rubber Co., as permanent receiver. The court's action assures continued operation of the tire factory. The Murray company was left with meager financial support by reason of the failure of the National Bank of Kentucky, Louisville, and Caldwell & Co., Nashville, Tenn., investment banking institutions. The Caldwell company acquired one-third of the Murray company stock and controlled two-thirds of the voting power. Mr. Branham declared the company has a large selling setup with 1398 stores in 30 states.

Westover Goes to McKinnon

M. R. Westover, who formerly was purchasing agent for the Olds Motor Works at Lansing, Mich., has been appointed general manager of the McKinnon Dash Co., a division of General Motors. Mr. Westover had been connected with Olds for nearly a dozen years.

Commercial to Finance Franklin

BALTIMORE, Jan. 27—The H. H. Franklin Mfg. Co. has entered into an exclusive agreement with Commercial Credit Companies providing for the retail time sale financing of Franklin products.

Autocar Opens Another Branch

ARDMORE, PA., Jan. 27—Autocar Co. has announced the opening of a factory branch at Salisbury, Md. This is the first branch to be established on the Maryland Eastern Shore by a truck manufacturer and will provide servicing facilities for the territory south of Wilmington, Del. It will be under the direction of C. M. Hogarth.

Asks Responsibility Law

CHARLOTTE, N. C., Jan. 26—The North Carolina Automotive Trade Association in mid-winter convention here adopted resolutions calling on the General Assembly in session at Raleigh to adopt the automobile safety responsibility act; consolidate automobile regulatory activities of three departments in a single commission; requires a state driver's license renewable biennially, and indorsed the movement opposing enactment of any sales tax legislation.

Philco Plans New Addition

PHILADELPHIA, Jan. 26—The Philadelphia Storage Battery Co., in line with its 1931 expansion program, will shortly ask for bids on a new plant addition to be erected in this city.

The new building will be constructed at a cost of more than \$300,000. When completed it will be occupied by the Philco subsidiary recently formed, the Transitone Automobile Radio Corp., organized to carry on the company's production of radio equipment for automobiles.

Chain Belt Reports Profit

CHICAGO, Jan. 26—Chain Belt Co., and its subsidiary, for the year ended Dec. 31, 1930, reports a net profit of \$514,711 after all charges and Federal taxes, equal to \$4.28 a share earned on 120,000 shares of no par capital stock. This compares with \$845,408, or \$7.04 a share, in the preceding fiscal year. The balance sheet shows current assets of \$3,098,689 as compared with \$3,114,890 last year and liabilities of \$356,099, against \$593,112 last year.

Heads Wisconsin Association

MILWAUKEE, Jan. 26—Leslie D. Frint, president of the Frint Motor Car Co., distributor of the Oldsmobile in Wisconsin and upper Michigan, with headquarters in Milwaukee, was elected president of the Wisconsin Automotive Trade Association at the annual meeting of the board in Milwaukee.

Seeks Tax Equalization

TALLAHASSEE, Jan. 26—A bill taxing bus and truck lines on an equal basis with railroads will be introduced at the next session of the Florida legislature by State Senator G. F. Andrews, of the Tenth District, it is learned.

De Vaux-Hall Names Additions to Staff

Leon Smith Assists The Engineering Group

CHICAGO, Jan. 26—Coincident with the first public showing of the De Vaux 6-75 (at the Chicago Automobile Show) De Vaux-Hall Motors Corp. has announced a number of additional personnel appointments. Forrest C. Storres, formerly with Oldsmobile and Franklin, has been appointed regional sales manager of the Atlantic region; F. E. Kennedy, for 4½ years with Hupmobile, has the sales managership of the Central region.

Leon Smith, formerly with American Car & Foundry Motors Corp., of which company Col. Elbert J. Hall is a director, has joined the De Vaux-Hall engineering organization and will be in direct charge under Col. Hall.

H. T. Kuhlman, who has been with the Durant Motor Co. in California, has been appointed plant engineer at Grand Rapids. In addition to Earl Cooper, whose connection with the De Vaux engineering staff was announced last week, Frank W. Vrooman has also been added to the engineering staff, concerning himself largely with production matters.

A. L. Warmington, formerly comptroller of a Chevrolet Pacific Coast plant, has been appointed comptroller of the De Vaux-Hall Motors Corp. The company has made arrangements with the Commercial Credit Co. to handle its retail sales financing. According to officials, production may get under way as early as late February, although early March appears more likely.

De Vaux Prices Set

DETROIT, Jan. 26—De Vaux-Hall Motors Co. has announced prices as follows on its recently announced line of cars:

Type	Price
Phaeton	\$545
Bus. coupe	595
Spec. coupe with wire wheels	625
Sport coupe with rumble seat and wire wheels	665
Sedan	695
Spec. sedan with wire wheels	725
Custom coupe—6 wire wheels	785
Custom sedan, 6 wire wheels	785

Above prices are f.o.b. Grand Rapids, Mich.

Massey Racine Plant Active

CHICAGO, Jan. 26—The Racine, Wis., plant of Massey-Harris Co. is operating during the current month at about 74 per cent of the level established in January, 1930. At present about 570 men are employed, compared with 775 last January.

Issues Engine Directory

NEW YORK, Jan. 27—The second annual Directory of American Aircraft Engines has just been issued by the International Nickel Co., Inc.

Renault Announces Four-Cylinder Model

Will Sell at
Price of \$1,000

PARIS, Jan. 9 (*by mail*)—After running almost exclusively on six-cylinder models for a couple of years, Renault has announced a new four-cylinder "Primaquatre" of 75 by 120 mm. bore and stroke (129 cu. in.), selling on the French market with five-passenger, four-door sedan body at just under \$1,000.

The car has a wheelbase of 103 in., track 51 in., body length 89 in., tire size 18 x 4 $\frac{3}{4}$ in., and a standard gear ratio of 11-43, which gives a maximum road speed of better than 60 m.p.h. Controlled by the Automobile Club of France, a stock sedan averaged 62.4 m.p.h. for six hours on Montlhery track, and on a 700-mile run from Paris to Bordeaux and return averaged 35.3 m.p.h., with a gas consumption of one American gallon per 25 miles. On this test the club refused to allow the car to be run in excess of 50 m.p.h.

With L-head cylinders and crankcase in one casting, pressed steel oil sump, and unit engine and transmission attached to the chassis at three points, the "Primaquatre" is similar in general design to the six-cylinder Renault of the same bore and stroke. Semi-elliptic springs are used in front and a transverse spring at the rear. Friction type shock absorbers are used, and mechanical four-wheel brakes; the propeller shaft is carried in a torque tube.

Only closed bodies are being produced, these including a four-door sedan, a coupe and a cabriolet. Individual seats are fitted in front and the rear seat on the sedan is adjustable and can be brought forward to receive baggage behind the back rest.

Buick to Keep Present Line

DETROIT, Jan. 26—The present line of 1931 Buick straight-eights will not be replaced by new models this summer, according to an official announcement by E. T. Strong, president of the Buick Motor Co.

This is in conformity with the suggestion of the National Automobile Chamber of Commerce that all its members announce their cars during the last months of each calendar year.

Studies Aircraft Labor

WASHINGTON, Jan. 26—"Wages and Hours of Labor in the Manufacture of Airplanes and Aircraft Engines," the first comprehensive study of the subject, has been announced in pamphlet form by the Bureau of Labor Statistics. The publication is Bulletin 523 of the bureau, and may be obtained from the Superintendent of Documents, Washington.

Sterling Body to Resume

KNOXVILLE, TENN., Jan. 26—Sterling Wood Products Co., manufacturers of automobile bodies, idle for the past three months, has decided to resume operations, according to an announcement by F. A. Butler, manager.

+ + CALENDAR + + OF COMING EVENTS

SHOWS

Amsterdam, Automobile...	Jan. 23-Feb. 1
Washington, D. C., Automobile...	Jan. 24-31
Chicago, National Automobile...	Jan. 24-31
Cleveland, Ohio, Automobile...	Jan. 24-31
Milan, Italy, Automobile...	Jan. 24-31
Los Angeles, Calif., Automobile...	Jan. 24-Feb. 1
Portland, Me., Automobile...	Jan. 26-31
Springfield, Mass., Automobile...	Jan. 26-31
Syracuse, N. Y., Automobile...	Jan. 26-31
Wilkes-Barre, Pa., Automobile...	Jan. 26-31
Lancaster, Pa., Automobile...	Jan. 27-31
York, Pa., Automobile...	Jan. 31-Feb. 7
Minneapolis, Minn., Automobile...	Jan. 31-Feb. 7
St. Paul, Minn. (Joint show with Minneapolis)	Jan. 31-Feb. 7
San Francisco, Calif., Automobile...	Feb. 1-8
Scranton, Pa., Automobile...	Feb. 2-7
St. Louis, Mo., Automobile...	Feb. 2-7
Copenhagen, Automobile...	Feb. 8-15
Dénver, Automobile...	Feb. 9-14
St. Petersburg, Fla., Automobile...	Feb. 9-14
Mankato, Minn., Automobile...	Feb. 11-14
Peoria, Ill., Automobile...	Feb. 11-15
Rapid City, S. D., Automobile...	Feb. 12-16
Indianapolis, Ind., Automobile...	Feb. 14-19
Providence, R. I., Automobile...	Feb. 14-21
Sacramento, Automobile...	Feb. 16-19
Berlin, Automobile...	Feb. 19-March 1
Quebec, Automobile...	Feb. 21-28
Memphis, Automobile...	Feb. 23-28
Des Moines, Automobile...	Feb. 23-28
Seattle, Wash., Automobile...	Feb. 24-Mar. 1
Camden, N. J., Automobile...	Feb. 25-March 2
Geneva, Automobile...	March 6-15
Altoona, Pa., Automobile...	April 15-27
International Garage Exposition, Berlin, Germany	May 9-Aug. 9

CONVENTIONS

Natl. Paving Brick Mfg. Association, Pittsburgh, Pa.	Feb. 4-6
Midwest Power Conference and Exhibition, Chicago	Feb. 10-13
A. S. M. E. Fuels Meeting, Chicago	Feb. 11-13
American Institute of Mining and Metallurgical Engineers, Annual Meeting, New York	Feb. 16-19
Society for Steel Treating (National Western Metal and Machinery Exposition), San Francisco	Feb. 16-20
Southern Automotive Jobbers Association, Atlanta	Feb. 19-21
Road Show and School, Wichita	Feb. 24-27
American Chemical Society, Indianapolis, Ind.	March 30-April 4
Aeronautical Chamber of Commerce, Detroit	April 11-19
U. S. Chamber of Commerce, Atlantic City	April 28-May 1
International Chamber of Commerce, Washington, D. C.	May 4-9
Fourth National Oil and Gas Power Meeting, A.S.M.E., Madison, Wis.	June 15-18

SALONS

Los Angeles, Calif., Biltmore Hotel	Feb. 7-14
San Francisco, Calif., Palace Hotel	Feb. 21-28

AC Products Sales Increase

DETROIT, Jan. 26—Sales of AC products in November and December showed increases over the same period a year ago, according to Harlow H. Curtice, president of AC Spark Plug Co. As AC supplies a large majority of car manufacturers with equipment, this increase would indicate that activity in the automotive industry is on the upgrade, Mr. Curtice said.

Curtiss-Wright 1930 Sales Exceeded 1929

Company's Exports
Gained 120 Per Cent

NEW YORK, Jan. 26—Curtiss-Wright Corp. sold more than \$18,000,000 worth of airplanes and engines during 1930, representing a considerable increase over it 1929 volume. Exports for the year amounted to \$3,720,000, an increase of approximately 120 per cent over 1929. Orders on hand as of Jan. 1, 1931, were \$12,000,000, as compared with \$10,000,000 on Jan. 1, 1930, an increase of 20 per cent.

In the field of operations, Curtiss-Wright Flying Service, a subsidiary of Curtiss-Wright Corp., operated with approximately 400 planes at more than 30 bases. Activities of the flying service include student instruction, local passenger flights, cross-country charter flights, scheduled passenger operations, crop dusting, forest patrol, aerial photography, survey for engineering projects, commercial air photography, test flying, aerial advertising, freight and express delivery by air and plane, and engine maintenance work.

British Aircraft Exports Down

WASHINGTON, Jan. 26—British aircraft exports during the first 10 months of 1930 declined from the high mark of 1929 but were maintained far ahead of the 1928 period, according to advices received in the Department of Commerce from Assistant Trade Commissioner William L. Kilcoin at London.

The total for the 10 months of 1930 was \$8,364,648, as compared with \$9,159,569 for the comparable period of 1929 and \$5,330,676 for the like period of 1928.

Inspected 17,364,096 Rims

CLEVELAND, Jan. 27—The Tire and Rim Association, Inc., inspected a total of 17,364,096 rims of all types during the year 1930, exclusive of rims manufactured by the Ford Motor Co. The figure compares with a total of 24,143,485 rims inspected during 1929, and 24,247,702 during 1928.

Carolina Buick Dealers Meet

CHARLOTTE, N. C., Jan. 26—Buick dealers of the two Carolinas gathered here a few days ago to discuss plans for the spring selling campaign. Paul Divver, manager of the Buick Motor Co.'s zone headquarters here, was in charge of the meeting.

50,000 Attend Ford Show

BALTIMORE, MD., Jan. 27—Approximately 50,000 persons attended a special Ford automobile show held in Baltimore during the week of Jan. 19 at the same time the annual automobile show was in progress.